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Kalispell, Montana

STATE DOCUMENTS

TRAFFIC SURVEY

KALISPELL

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Swift Current Lake and Many Glacier Hotel

Jim Davis Photo

URBAN AREA TRAFFIC SURVEY

KALISPELL, MONTANA

CONDUCTED BY THE

MONTANA HIGHWAY COMMISSION

PLANNING SURVEY

AND

THE CITY OF KALISPELL

IN COOPERATION WITH

U.S. DEPARTMENT OF COMMERCE

BUREAU OF PUBLIC ROADS

1954

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HARRY TAYLOR, Chairman of The Council
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A C K N O W L E D G E M E N T S

The assistance that was freely given by all Kalispell City Officials and the hundreds of motorists who were inconvenienced while the interviewing was in progress is hereby acknowledged.

Technical data were obtained from published reports of the Bureau of Public Roads, other State Highway Departments, and various traffic agencies.

STATE OF MONTANA
HIGHWAY COMMISSION
HELENA

August 26, 1955

The Honorable Claude Walter, Mayor
and
Members of the City Council
Kalispell, Montana

Gentlemen:

It is a pleasure to present to you the final report on the Kalispell Traffic Survey which was conducted in August of 1954. This project was made possible by the coordinated efforts of your City, the Bureau of Public Roads and the State Highway Department.

We trust that the factual data and the resultant recommendations will be of assistance and value to you in planning the alleviation of traffic problems.

We offer you our thanks for the fine cooperation you have given us in completing the project and want you to know that it has been a pleasure to work with you.

Our interest in your traffic problems is a continuing one and we assure you that we will be pleased to try to help you any time we have the opportunity.

Respectfully submitted,

Scott P. Hart

Scott P. Hart
State Highway Engineer

SPH:jah

DEFINITIONS

ORIGIN AND DESTINATION STUDY. A study of the origins and destinations of trips made by vehicles passing out of, into, or through a selected area.

EXTERNAL ORIGIN AND DESTINATION STUDY. That part of an origin and destination study conducted usually by roadside interviews on main highways entering a certain area or city.

INTERNAL ORIGIN AND DESTINATION STUDY. That part of an origin and destination study usually conducted by interviewing motorists entering or leaving the central business district of a city.

CENTRAL BUSINESS DISTRICT. The major business district of a city, also commonly called the downtown area.

CORDON LINE. A line used to define and bound a certain area. In this study the area bounded by the cordon line was the central business district.

CORDON COUNT. A count of all vehicles entering and leaving a certain area (central business district) during a specified length of time.

TRAFFIC PATTERN. A tabular or graphical presentation of the fluctuation of traffic over a specified period of time.

TRIP. The one-way travel of one vehicle between an origin and destination.

DESIRE LINE. A straight line between a point of origin and a point of destination without regard to existing routes.

SPACE HOUR. One parking space used for one hour. A term used to measure parking supply and demand on a comparable basis.

PARKING DEMAND. Total need for parking space as determined by the expressed origins and destinations of drivers.

PEAK HOUR OF ACCUMULATION. The hour during which there is the maximum accumulation of vehicles within the survey area.

PARKING TURNOVER. The number of vehicles using one parking space during a specified length of time.

DESIGN VOLUME. A traffic volume determined for use in design representing traffic expected to use the facility. Unless otherwise stated, it is an hourly volume roughly corresponding to the 30th maximum hour for the year.

POSSIBLE CAPACITY. The maximum number of vehicles that can actually be accommodated by an intersection approach under prevailing conditions with a continual backlog of waiting vehicles.

PRACTICAL CAPACITY. The maximum number of vehicles that can enter an intersection from any approach with most of the drivers being able to clear the intersection without waiting for more than one complete signal cycle.

SURVEY HIGHLIGHTS

The average weekday traffic entering or leaving Kalispell in August 1954 totaled 14,396 vehicles of which 13,118 were passenger cars and light trucks and 1,278 were medium and heavy trucks.

Only 2,532 vehicles or approximately 18 per cent of the total external traffic did not make an essential stop in Kalispell.

A total of 4,334 passenger cars and 291 medium and heavy trucks or 32 per cent of the total external traffic had either an origin or destination in the central business district.

The maximum accumulation of vehicles within the business district on an average weekday in August occurred at 11 A. M. and continued at approximately the same level until 4 P.M.

The average length of time parked at the curb on Main Street in two representative blocks was 53 minutes. Only 28 per cent of the total number of vehicles parked for over one hour but they used approximately 70 per cent of the total available space hours.

RECOMMENDATIONS

In a preliminary report to the City of Kalispell, submitted in September 1954, it was strongly recommended that the City change from angle to parallel parking as one of the major measures of reducing traffic congestion and increasing street capacity. This recommendation was acted on favorably by the City Council and parallel parking has now been in effect on Main Street and First Avenue East since about January 1, 1955. A marked decrease in congestion during peak hours is noted with a corresponding decrease in overall travel time through the business district. Some intersectional delay caused by the present signal sequence is still present on Main Street and this condition can be improved to some extent by retiming the signals as shown on Plate 25. Under this system traffic should progress in either direction on a 14 second *through band* at about 19 miles per hour.

PARKING

The change from angle to parallel parking reduced the number of available curb parking spaces by approximately 40 per cent. This means a loss of about 75 spaces on Main Street and 65 spaces on First Avenue East between Railroad and Fifth Streets. This loss has been partially compensated for by the establishment of one public lot with a 40 car capacity in the 100 block on Main Street and a customer parking lot with the same capacity at Second Avenue East and Second Street.

The results of a partial parking study indicate that the parking situation on weekdays is not too acute even during peak hours if the average motorist would be satisfied to walk one additional block. Curb parking on Main Street was practically filled to capacity between 2 and 3 P.M. on Friday, August 20, 1954 but ample parking spaces were generally available within two blocks either east or west of Main Street. Since the national average distance that a parker is willing to walk in a city the size of Kalispell is less than two blocks it is recommended that approximately 100 additional off street parking spaces be eventually provided within two blocks of the principal business frontage. It is suggested that the surplus meters that were removed from Main Street and First Avenue East when parallel parking

was initiated might be utilized in off street parking lots under the jurisdiction of the City. Meter rates for parking in these lots should be the same as for curb parking with the additional inducement to the motorist of being able to place sufficient money in the meters to cover 4 or 5 hours of parking.

The results of a parking turnover study conducted on two blocks in the central business district indicate that more efficient use can be made of the existing curb parking facilities. Plates 16 and 17 show the results of this study. It will be noted that the average time parked at the two hour meters in these two blocks adjacent to Main Street was only 53 minutes. Only about 28 per cent of the total number of vehicles parked for over one hour in each block but they used 62 per cent and 75 per cent respectively of the available space hours.

It is therefore recommended that the two hour meters on Main Street be changed to one hour and that a program of strict enforcement of the proposed one hour parking regulation be inaugurated.

As a further aid in providing more curb space for potential customers it is suggested that Main Street merchants and their employees be encouraged to park their cars in off street parking lots. It was found that automobiles belonging to a few merchants or their employees were parked for as long as 7 ¾ hours in front of their place of business.

TRUCK BY-PASSES

One of the objectives of this traffic study was to determine the relative need for a truck by-pass from north to south on the east edge of the City between U.S. 93 and U.S. 2. The results of the origin and destination study indicate that this proposed truck route is not necessary at this time. Drivers of only 21 medium and heavy trucks indicated that they did not have any business to transact in the City and that they could use an east side by-pass. In addition to the truck traffic, approximately 300 passenger cars did not stop in the City enroute between U.S. 93 South and U.S. 2 East. These passenger car trips could theoretically be assigned to a by-pass but in actual practice a fairly high percentage would probably still use Main Street after a by-pass was built if for no other reason than to see the City.

The proposed location of this route lies at a considerable distance east of the City and the sharp drop from the townsite to the proposed route precludes easy access through extensions of existing streets. Second Street extension adjacent to the City Park would probably develop into the main connection between the proposed by-pass and the industrial areas. If this is the case, the disadvantages of routing heavy truck traffic through a park area are quite obvious.

As an alternate to a north - south truck by-pass it is suggested that First Avenue West be designated as a truck route by suitable signing from Railroad Street on the north to the south city limits and that all medium and heavy trucks be prohibited from using Main Street except to load or unload..

IDAHO STREET

Traffic volumes on Idaho Street (U.S. 2) from Main Street East have reached such proportions that they are now overloading and badly congesting this two lane facility. Average daily traffic on this section was over 9,000 vehicles per day during August of 1954 with a peak recorded hour of 898 vehicles. The two signalized intersections at Main Street and 3rd Avenue East were within 10 per cent of their practical traffic capacity during August of 1954 and it is estimated that they will exceed practical capacity within the next two years. It is therefore imperative that an adequate facility be provided in the near future to handle the present and anticipated traffic volumes through the City from the junction of Appleway on the west to F.A.S. Route 206 to Half Moon on the east -- a distance of approximately 3.4 miles. (See Plate 2B).

Three possible methods of gaining additional traffic capacity on Idaho Street are worthy of consideration. These methods are (1) sufficient widening of the existing street section to provide for four lane traffic, (2) prohibition of curb parking on one or both sides of Idaho Street, and (3) establishing a one-way street couplet by using both Idaho and Washington Streets.

The reconstruction of Idaho Street to a four lane standard would require the acquisition of a minimum of eight feet of additional right of way for a total of 74 feet. This width will provide four twelve foot traffic lanes,

two eight foot parking lanes, and two five foot sidewalks. A raised median strip at least four feet wide is considered desirable on a major street facility of this type if the additional right of way can be readily obtained. On Idaho Street, however, right of way would be one of the prime considerations, and it is therefore suggested that the median strip be omitted on the street section with the exception of the two blocks east and west of Main Street. (See Plate 2C.)

The volume of left turns from Idaho Street to Main Street is at present sufficient to warrant a separate left turn lane for west bound traffic. This necessary left turn lane could be provided by prohibiting parking on Idaho Street from Main Street to First Avenue East. The additional width could then be utilized for the construction of a raised median with provisions for a left turn bay. Although the volume of left turning movements on Idaho Street west of Main do not warrant a separate left turn lane and median, such an installation is desirable to balance the design at this intersection.

The prohibition of all curb parking during peak hours on Idaho Street through Kalispell would probably gain the most traffic capacity for the least expenditure of any of the three proposals. It is estimated that this measure could increase the traffic capacity of the existing street by as much as 60 per cent.

The principal disadvantage of this measure lies in the fact that Idaho Street at the present time requires reconstruction. If the present curb to curb width of 42 feet is reconstructed it still will not be adequate for future four lane operation even with parking prohibited. For this reason it is suggested that the prohibition of parking be considered only as a stop gap measure.

Another alternate would be the establishing of a one-way couplet through Kalispell by using Idaho Street for east bound traffic and Washington Street for west bound traffic between 7th Avenue West and the present underpass near the east city limits. Diagonal connections should be constructed on each end of the couplet to facilitate the transition from one-way back to two-way operation.

This proposal has the following advantages: 1. It would utilize existing facilities to the fullest extent without disturbing present property

lines, 2. Traffic operation should be safer due to the elimination of most of the major conflicts, and 3. Traffic carrying capacity of each street should increase.

The principal disadvantages of one-way operation are 1. Two streets instead of one would require reconstruction and maintenance, 2. Washington Street is now primarily residential and it appears undesirable to route heavy through traffic over a residential street, and 3. There could be some disruption of business on Idaho Street due to the one-way operation.

In view of the foregoing discussion it is recommended that a four lane facility be constructed on Idaho Street provided it proves feasible from a cost standpoint when compared with the cost of the proposed one-way couplet. The probable cost of the additional right of way on Idaho Street could be the determining factor.

MAIN STREET

Two major traffic bottlenecks remain on Main Street after the change to parallel parking. These are the *Court House Loop* and the *Center Boulevards* between 6th and 8th Streets.

Inasmuch as the Court House was constructed on a site between 8th and 9th Streets directly blocking Main Street, it is necessary for Main Street traffic to split to the east and west around the building on two circular one way streets. This situation was considered picturesque in the era of the horse and buggy but the sharp curvature in the circular driveways through the Court House Grounds does not meet the requirements of modern traffic.

In order to improve this alignment it is recommended that the present curvature be eased as much as possible and the present roadway widened.

The center boulevards in the Main Street section between 6th and 8th Streets occupy 16 feet of valuable street space that could be more profitably used for moving traffic. If they were removed the present curb to curb width of 66 feet could accommodate four twelve foot traffic lanes and two nine foot parking lanes. This standard should provide ample street capacity for any anticipated traffic volumes in the forseeable future. It therefore is recommended that the center boulevards be removed.

Research studies have indicated that the proper striping of center and lane lines on an urban facility has the following important advantages:

1. Vehicles are driven closer to their proper position on the street.
2. More effective use is made of available street widths.
3. Congestion is reduced at intersections and average traffic speeds increased.

In view of these three important considerations it is recommended that Main Street be striped according to the suggested layout shown on Plate 2.

ARTERIAL STREETS

Traffic patterns in Kalispell indicate the need for an additional east-west arterial in the vicinity of Sixth Street (see Plate 1) with the final selection depending on present street widths and type and condition of existing surfaces. Preferential treatment should be accorded this arterial at all intersections with the exception of Meridian Drive, First Avenue West, Main Street, 3rd Avenue East, and Woodland Avenue.

Third Avenue East is recommended as an additional north - south arterial from Idaho Street to a junction with U.S. 93 near the south city limits. Preferential treatment should be given this street at all intersections with the exception of U.S. 93, Second, and Idaho Streets. The present curb to curb width of 3rd Avenue East will be inadequate to handle the anticipated traffic volumes during the next ten years. For this reason it will become necessary to either widen the street by removing the existing planted boulevards or to prohibit curb parking on one or both sides.

After Third Avenue East is in operation as an arterial, it is recommended that the stop signs be removed from the intersecting streets on First Avenue East from Sixth to Thirteenth Streets. These signs could be utilized on some of the major intersections of the proposed arterials.

Fifth Avenue West has been designated as an arterial between Eighth and Railroad Streets. It is recommended that this arterial be extended northerly to Idaho Street and that it be terminated on the south at Sixth Street. Preferential treatment should be accorded this arterial at all intersections with the exception of 2nd and 6th Streets.

The comparatively new *Yield Right-of-Way Sign* probably could be used to advantage on many of the minor intersecting side streets on the proposed arterial system. The effect of this sign is similar to that of the stop sign but with the added advantage that vehicles controlled by it need not come to a full stop except when necessary to avoid interference with other traffic that is given the right-of-way.

ISOLATED INTERSECTION TREATMENT

Some consideration has been given to the installation of traffic signals at the two intersections of First Avenue West and First and Third Streets. Recent traffic counts taken at these intersections indicate that present traffic volumes do not meet the minimum warrants for signalization as recommended in the Manual on Uniform Traffic Control Devices.

These minimum vehicular traffic volume warrants for signal installation at a normal four way urban intersection are as follows:

1. Total vehicular volume entering the intersection from all approaches must exceed 750 vehicles for each of eight hours of an average day, and
2. Total vehicular volume entering the intersection from the minor street or streets must exceed 250 vehicles per hour for the same eight hours.

Traffic entering the intersection of First Avenue West and First Street from all directions totaled only 522 vehicles during the peak hour of 4:15 - 5:15 P.M. on Monday, May 9, 1955. It is estimated that this volume may increase as much as 25 per cent during peaks of the tourist season but the intersection would still not meet the minimum traffic volume requirements for signalization.

Traffic volumes entering the intersection of First Avenue West and Third Street totaled 667 vehicles during the peak hour of 4:30 - 5:30 P.M. on May 9, 1955. Anticipated seasonal increases will bring this volume up to a point above the minimum warrants during the peak hours, but the hourly volumes for any 8 hours of an average day still will not be sufficient to warrant signalization.

It is therefore recommended that signalization of these two intersections be deferred until such time as traffic volumes meet or exceed the minimum recommended warrants. It is further suggested that stop signs placed on First and Third Streets will be sufficient traffic controls for present volumes.

MODEL TRAFFIC ORDINANCE

Kalispell, like a great many other cities of similar size, has a number of obsolete traffic ordinances in effect that do not apply to modern traffic conditions. It is therefore suggested that the City make a concentrated effort to review and modernize all ordinances applying to the control of traffic within the City. The Model Traffic Ordinance, published by the Department of Commerce, Bureau of Public Roads, is an excellent guide in revising such ordinances.

SIGHT DISTANCE

In the interests of generally improving traffic conditions throughout the City of Kalispell and especially in the residential areas, it is suggested that the City adopt an ordinance prohibiting the obstruction of sight distance at street intersections by shrubs or trees for a distance of approximately 80 feet in both directions measured along centerline of the intersecting streets. A straight line connecting the two points 80 feet from the intersecting center lines will form a triangular area in which all shrubs should be kept trimmed to a maximum of 30 inches above the sidewalk and all trees limbed to a minimum of 8 feet above the sidewalk. (See Plate 2A.) This measure should correct the hazards caused by lack of sight distance which are now present at some of the intersections in the residential areas.

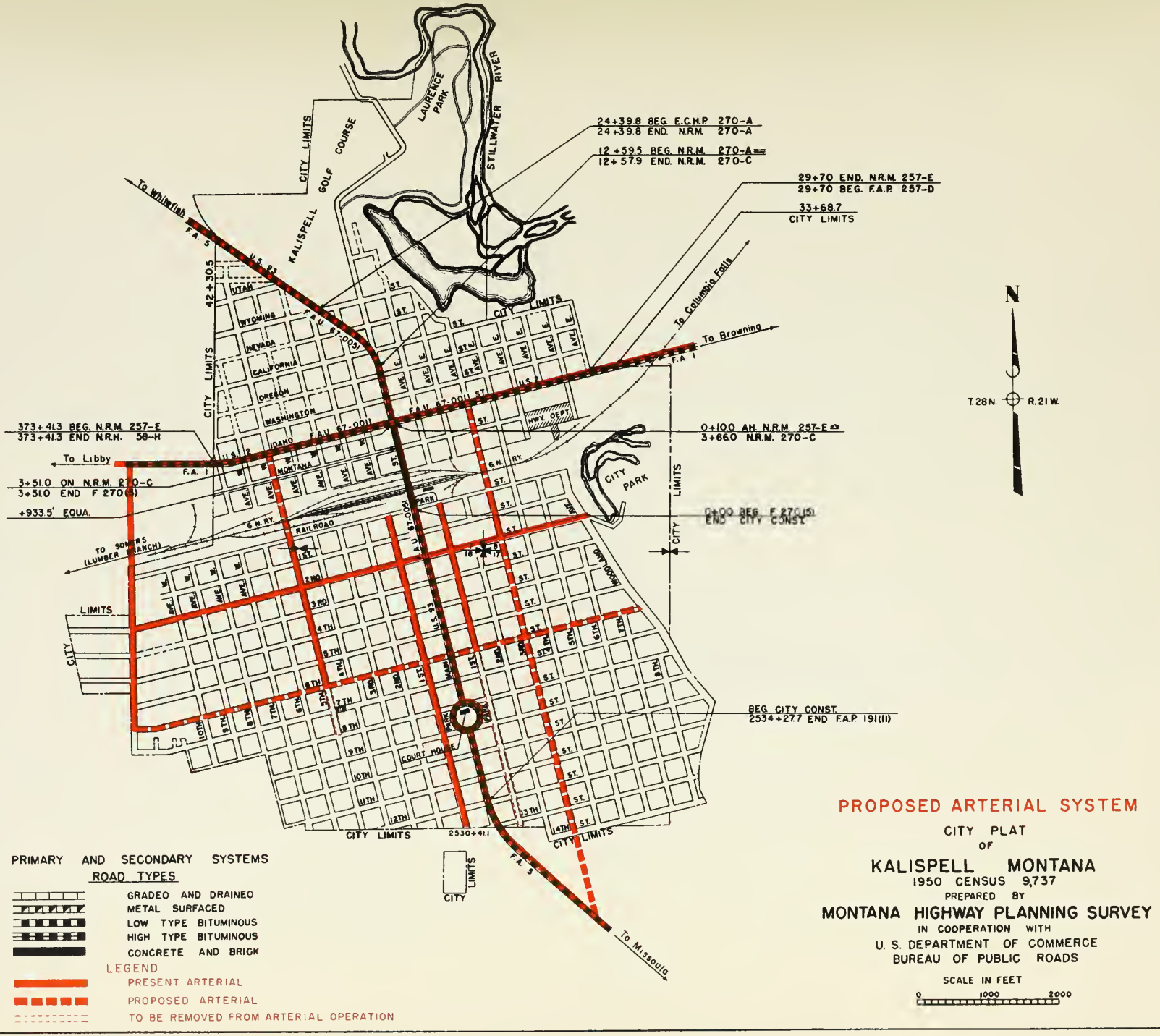
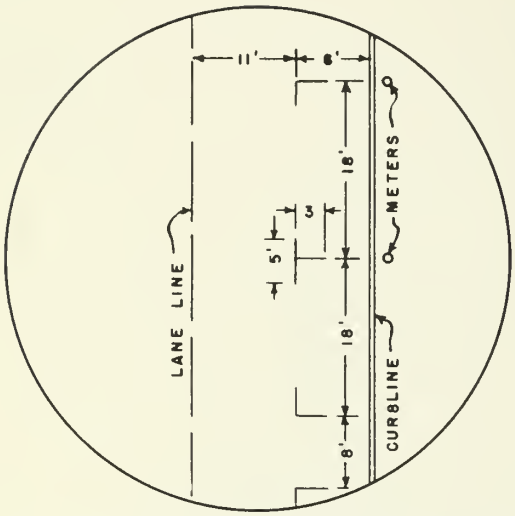
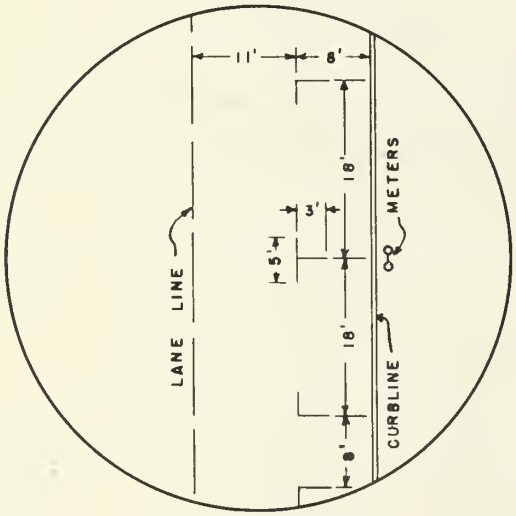

PROPOSED ARTERIAL SYSTEM
CITY PLAT
OF
KALISPELL MONTANA
1950 CENSUS 9,737
PREPARED BY
MONTANA HIGHWAY PLANNING SURVEY
IN COOPERATION WITH
U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
SCALE IN FEET
0 1000 2000
N
T.28 N.
R.21 W.
PRIMARY AND SECONDARY SYSTEMS
ROAD TYPES
GRADED AND DRAINED
METAL SURFACED
LOW TYPE BITUMINOUS
HIGH TYPE BITUMINOUS
CONCRETE AND BRICK
LEGEND
PRESENT ARTERIAL
PROPOSED ARTERIAL
TO BE REMOVED FROM ARTERIAL OPERATION
24+39.8 BEG. E.C.H.P. 270-A
24+39.8 END. N.R.M. 270-A
12+59.5 BEG. N.R.M. 270-A
12+57.9 END. N.R.M. 270-C
29+70 END. N.R.M. 257-E
29+70 BEG. F.A.P. 257-D
33+68.7
CITY LIMITS
373+41.3 BEG. N.R.M. 257-E
373+41.3 END N.R.M. 58-H
3+51.0 ON N.R.M. 270-C
3+51.0 END F 270(8)
+933.5' EQUA.
0+10.0 AH. N.R.M. 257-E
3+66.0 N.R.M. 270-C
0+00 BEG. F 270(15)
END CITY CONST.
BEG. CITY CONST.
2534+27.7 END F.A.P. 191(11)
2530+41.1
To Whitefish
To Libby
To Somers (Lumber Branch)
To Browning
To Columbia Falls
To Missoula
F.A. 5
F.A. 1
U.S. 93
U.S. 2
F.A.U. 67-003
F.A.U. 67-001
F.A.U. 67-005
KALISPELL GOLF COURSE
LAURENCE PARK
STILLWATER RIVER
CITY PARK
HWY. DEPT.
G.N. RY.
RAILROAD
COURT HOUSE
UTAH
WYOMING
NEVADA
CALIFORNIA
OREGON
WASHINGTON
IDAHO
MONTANA
MAIN
1ST
2ND
3RD
4TH
5TH
6TH
7TH
8TH
9TH
10TH
11TH
12TH
13TH
14TH
ST.
AVE.
42+30.5

Plate 1

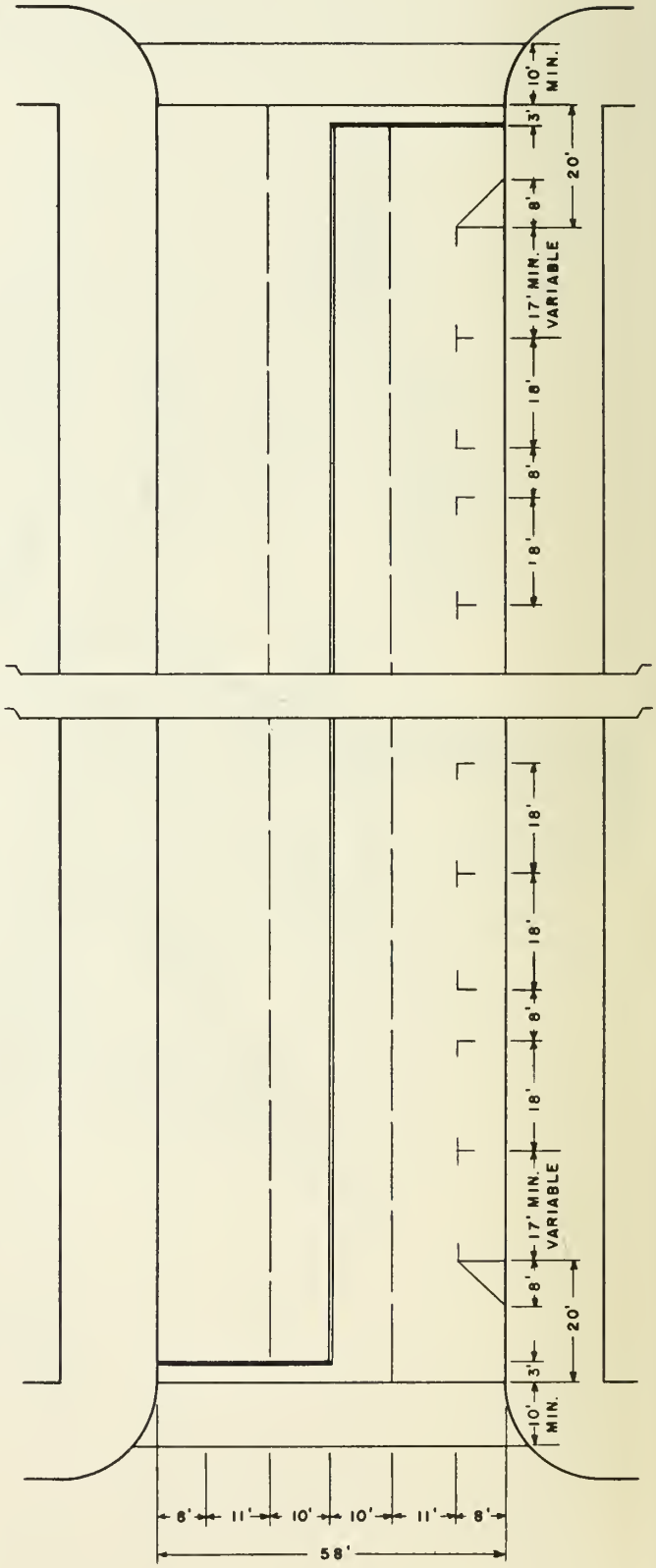
RECOMMENDED
PAVEMENT MARKING LAYOUT
PAIRED PARALLEL PARKING
MAIN STREET OF KALISPELL



DETAIL OF "PAIRED" PARALLEL PARKING - "T" TYPE STALL MARKINGS - ONE METER STANDARD FOR EACH VEHICLE.



DETAIL OF "PAIRED" PARALLEL PARKING - "T" TYPE STALL MARKINGS - ONE METER STANDARD FOR TWO VEHICLES AND TWO METERS.



PAVEMENT MARKING SPECIFICATIONS

CENTER LINE - TWO SOLID 4" YELLOW LINES SEPARATED BY A 4" SPACE.

LANE LINES - BROKEN OR SOLID 4" WHITE LINES.

STOP LINE - ONE SOLID WHITE LINE NOT LESS THAN 12" WIDE.

CROSS WALK LINE - ONE SOLID WHITE LINE NOT LESS THAN 4" OR MORE THAN 12" WIDE.

PARKING STALL LINE - ONE SOLID WHITE LINE NOT LESS THAN 4" WIDE OR MORE THAN 6" WIDE.

RECOMMENDED SIGHT DISTANCE TRIANGLE

RESIDENTIAL AREAS

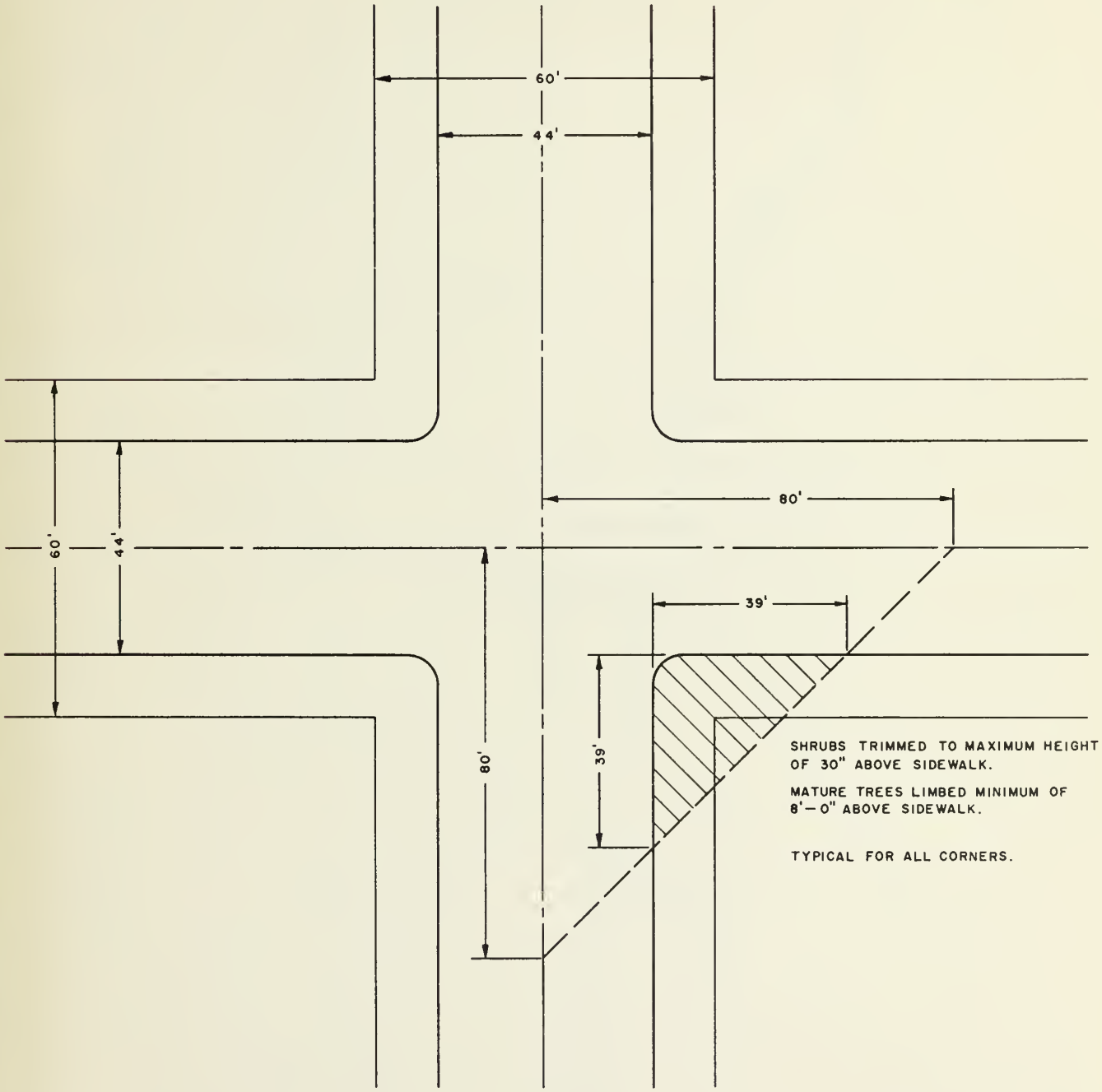
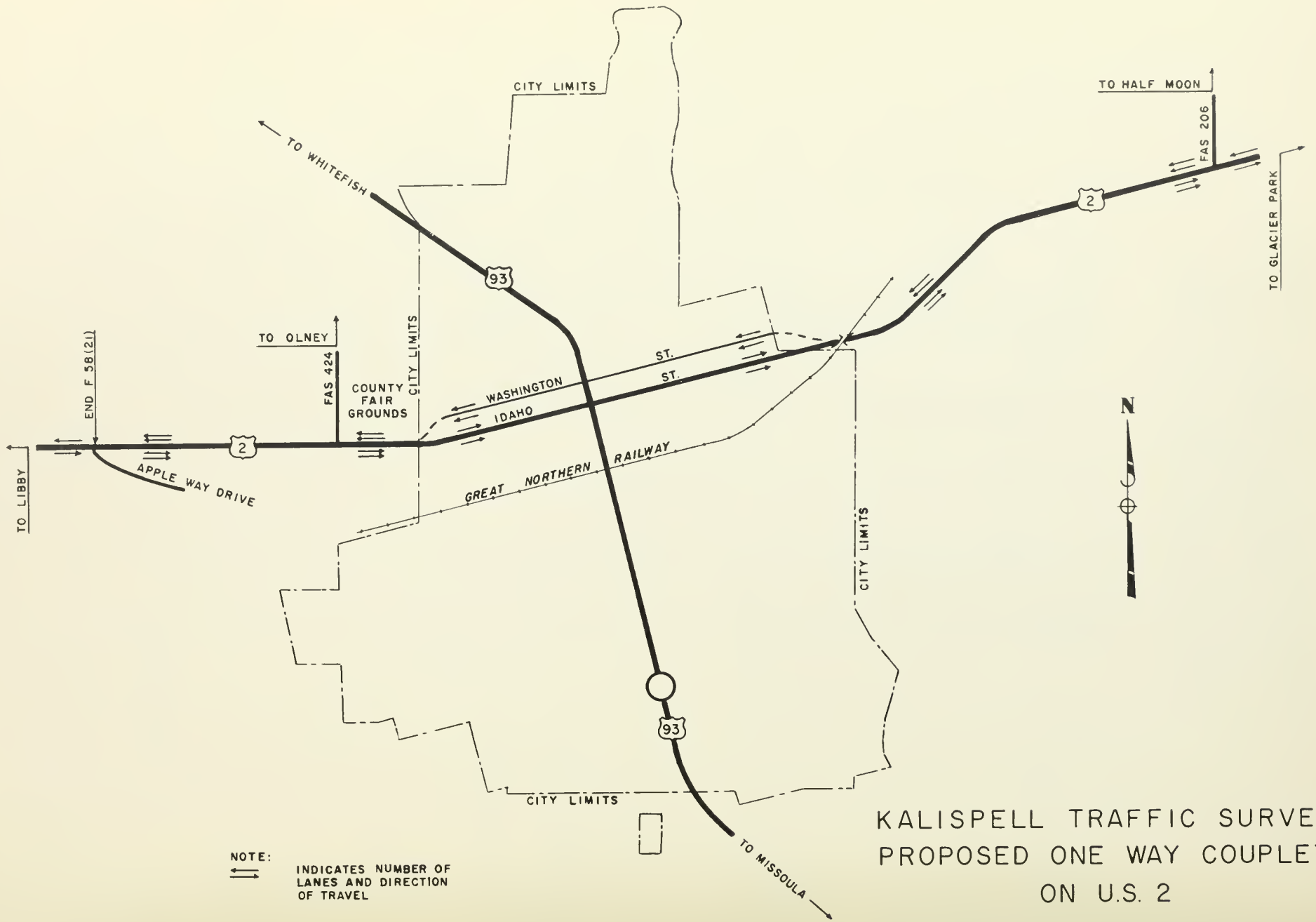


Plate 2A



KALISPELL TRAFFIC SURVEY
PROPOSED ONE WAY COUPLET
ON U.S. 2

PLATE 2B

KALISPELL TRAFFIC SURVEY
PROPOSED MEDIANS & LEFT TURN LANES
FIRST AVE. WEST – FIRST AVE. EAST

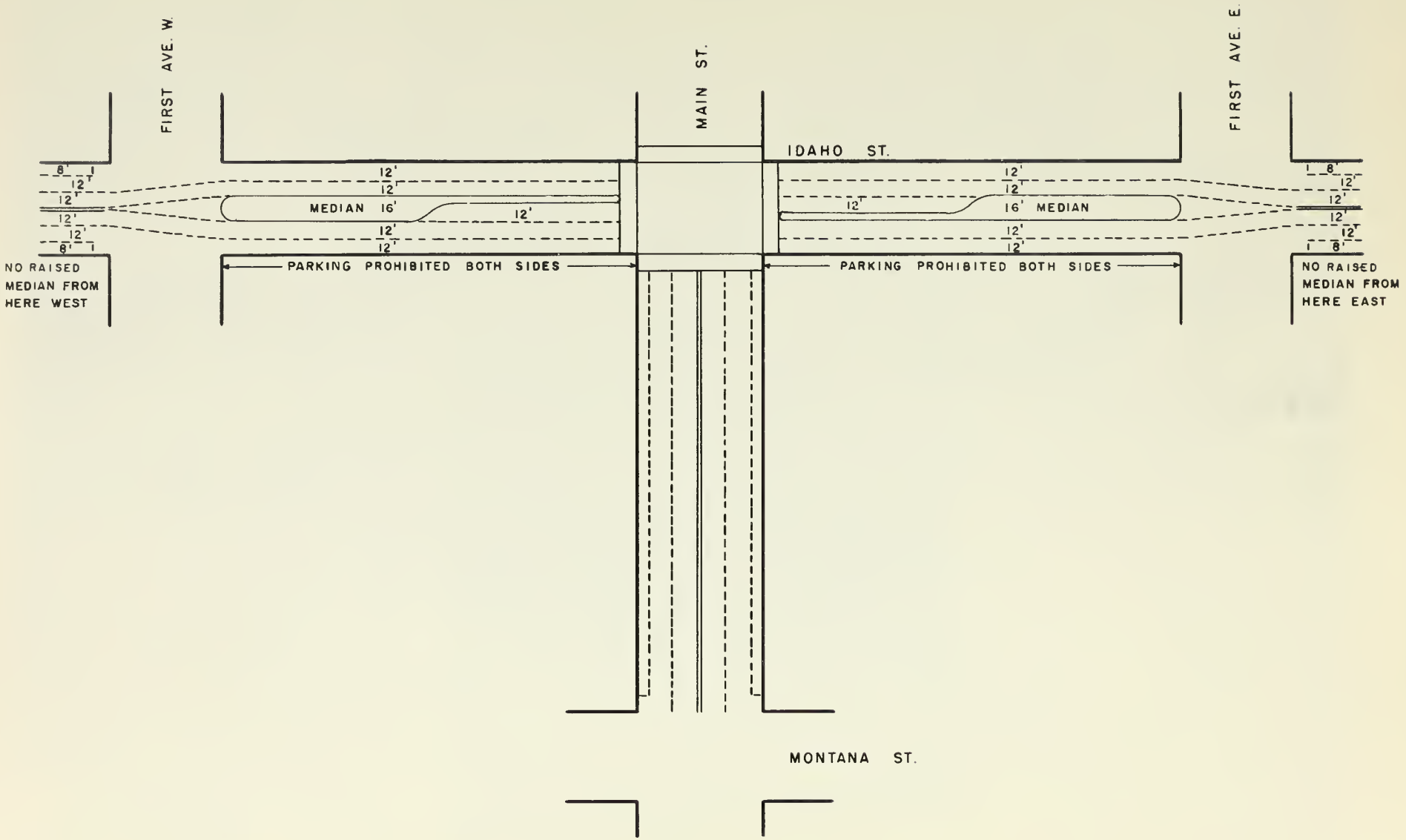
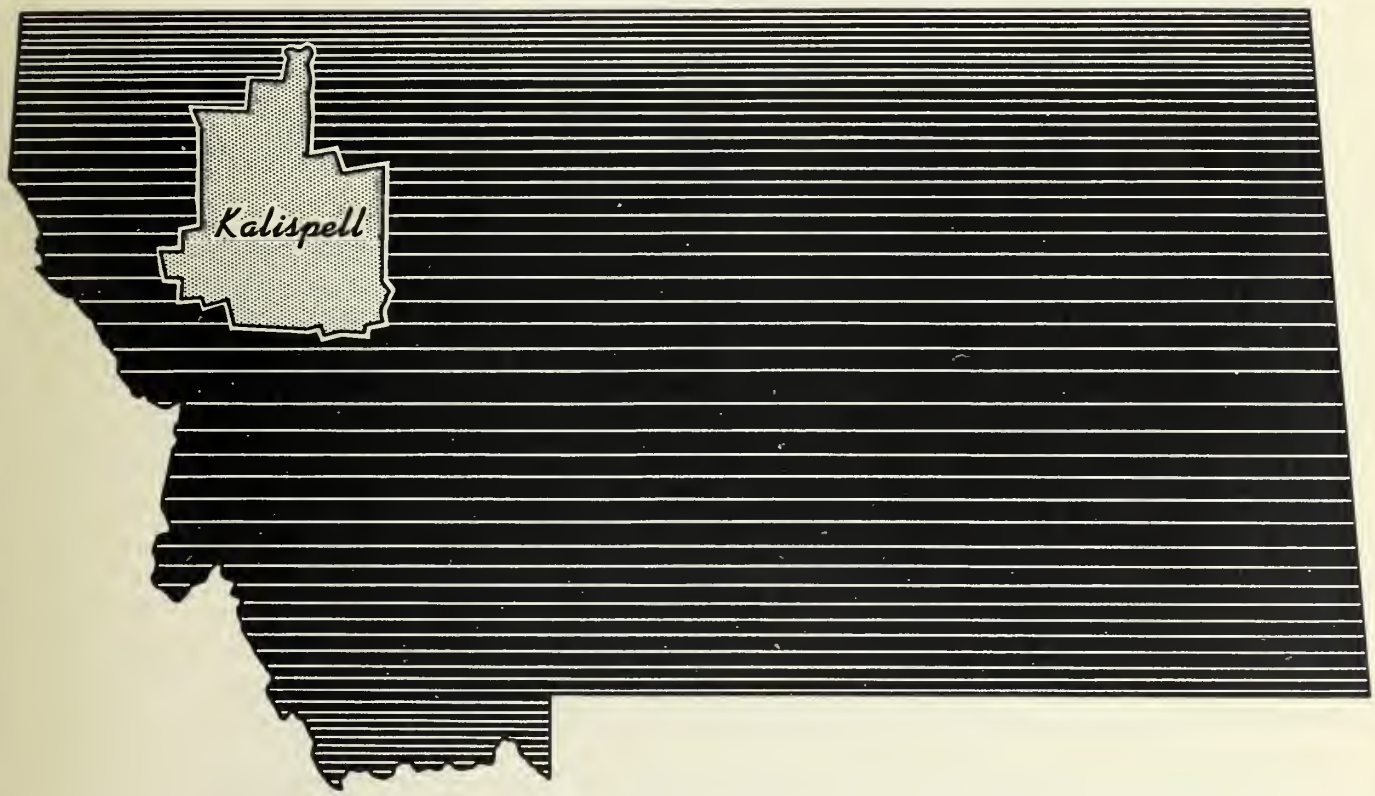


PLATE 2C

Kalispell -- 1892

Introduction



History & Development

GENERAL CHARACTERISTICS

Kalispell, the county seat of Flathead County, is favorably situated in the fertile Flathead river valley about 30 miles southwest of Glacier National Park. The City has a mean elevation of approximately 3,000 feet with surrounding mountain peaks rising to elevations of over 9,000 feet above sea level. Agriculture, lumbering, and recreation - based on the tourist trade - are the principal industries of the area. In 1950 the City had a population of 9,737 which ranks it eighth among Montana's cities.

The main business district is confined principally to Main Street and First Avenue East between Railroad and 5th Streets. The industrial area is situated along both sides of the Great Northern Railway through the City with many of the larger truck terminals located south of the railway right-of-way between Main Street and 5th Avenue West.

Some of the better residential areas and a highly developed city park are located to the east of Main Street. The area north of the railway consists of a secondary business district, residential areas, and a municipal golf course.

Main Street has ample width at most points to accommodate present traffic volumes but almost all other streets and avenues are comparatively narrow due to the wide planted boulevards.

HISTORY

David Thompson, early explorer and geographer, is credited by most historians with being the first white man to enter the Flathead river valley about 1809. It was not until 1842, however, that the Hudson Bay Company established a semi-permanent fur trading post at the north end of Flathead Lake. Trade with the Indians flourished until about 1880 when the post was abandoned.

In 1882 the town of Ashley was established just west of the present site of Kalispell and five years later Demersville was located on the Flathead River about three miles south of Ashley. Demersville prospered from the start and within a short time had several general stores, a newspaper, post office, and numerous bars.

When it became known that the Great Northern Railway contemplated extending its line from Havre to the west coast, interest in the Flathead country reached new highs and every effort was made to anticipate its probable course through the valley. It was assumed that Demersville, because of its location at the head of navigation, had a slight edge in the struggle for the location of the railroad's division shops. On the off chance that this site was too far south Columbia Falls was laid out by speculators at the mouth of Bad Rock Canyon. Neither of these towns became the division point because James Hill instructed his agents to procure land for an entirely new townsite.

In 1891 the present site of Kalispell was laid out by railroad surveyors and was promptly dubbed *Alkali Flats* by the other struggling communities in the valley. During this summer, hay was harvested on the platted streets but by fall the Great Northern steel gangs finally reached the townsite and the inevitable boom was on. By the spring of 1892, the entire town of Demersville had moved to Kalispell, Ashley was dead, and the original townsite of Columbia Falls had been missed by the railroad by about one mile.

An election was held in January of 1892 to decide the issue of incorporating Kalispell. At this first election, 243 votes were cast - most of them affirmative. A further boost to the new City was its designation in 1893 as the county seat of the newly formed Flathead County.

Kalispell continued to boom until 1902 when the Great Northern Railway relocated its main line to avoid a steep grade and moved its division shops to Whitefish. This caused a temporary set back to the new community which was eventually overcome by the development of the lumbering and agricultural industries in the surrounding area.

Kalispell has progressed steadily from a raw, frontier village to one of Montana's leading cities in the relatively short span of 63 years. It appears destined to continue to progress in the foreseeable future.

INDUSTRY AND COMMERCE

Due to its location, Kalispell has become one of the major trading centers of northwestern Montana. Its industry and commerce are devoted primarily to serving the lumbering and agricultural interests of the surround-

ing territory and in catering to the ever increasing tourist trade. An aluminum plant, capable of producing 60,000 tons of refined aluminum per year, is scheduled to go onto production during 1955 at a site near Columbia Falls about twelve miles north of Kalispell. The anticipated employment of 450 to 500 men at this plant should do much towards stabilizing the economy of the area.

Two transcontinental highways, U.S. 2 and U.S. 93, serve the City. U.S. 2 provides a direct connection to Glacier National Park located approximately thirty miles to the east. One bus line and several truck lines operate from modern terminals located in Kalispell.

The Great Northern Railway provides rapid transportation for both passengers and freight to all parts of the country as well as local service for numerous saw mills in the surrounding territory.

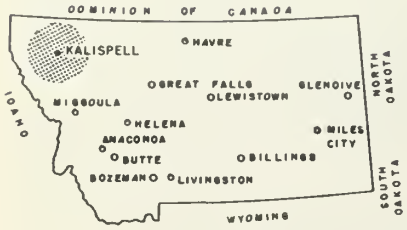
Northwest Airlines serves the City from a modern airport and chartered flights to some of the more isolated recreational areas can be arranged with private companies.

TRAFFIC PROBLEMS

Kalispell today is faced with many traffic problems that are a direct result of the rapid expansion that has taken place since the close of the Second World War. Streets that were entirely adequate to carry prewar traffic volumes suddenly became overloaded with the unforeseen increases in postwar traffic. Angle parking, which had been in use on Main Street since the days of the horse and buggy, was now being questioned as to whether it contributed to the general congestion. Truck traffic on Main Street had increased to a point where some consideration was given to a north - south by-pass route around the City and Idaho Street was fast approaching practical traffic capacity.

In an effort to solve some of these more pressing traffic problems, the city of Kalispell requested the Montana Highway Commission to conduct a traffic survey of the urban area. A cooperative agreement was reached between the planning Survey Department and the city of Kalispell and field work began in August 1954.

Main Street About 1904



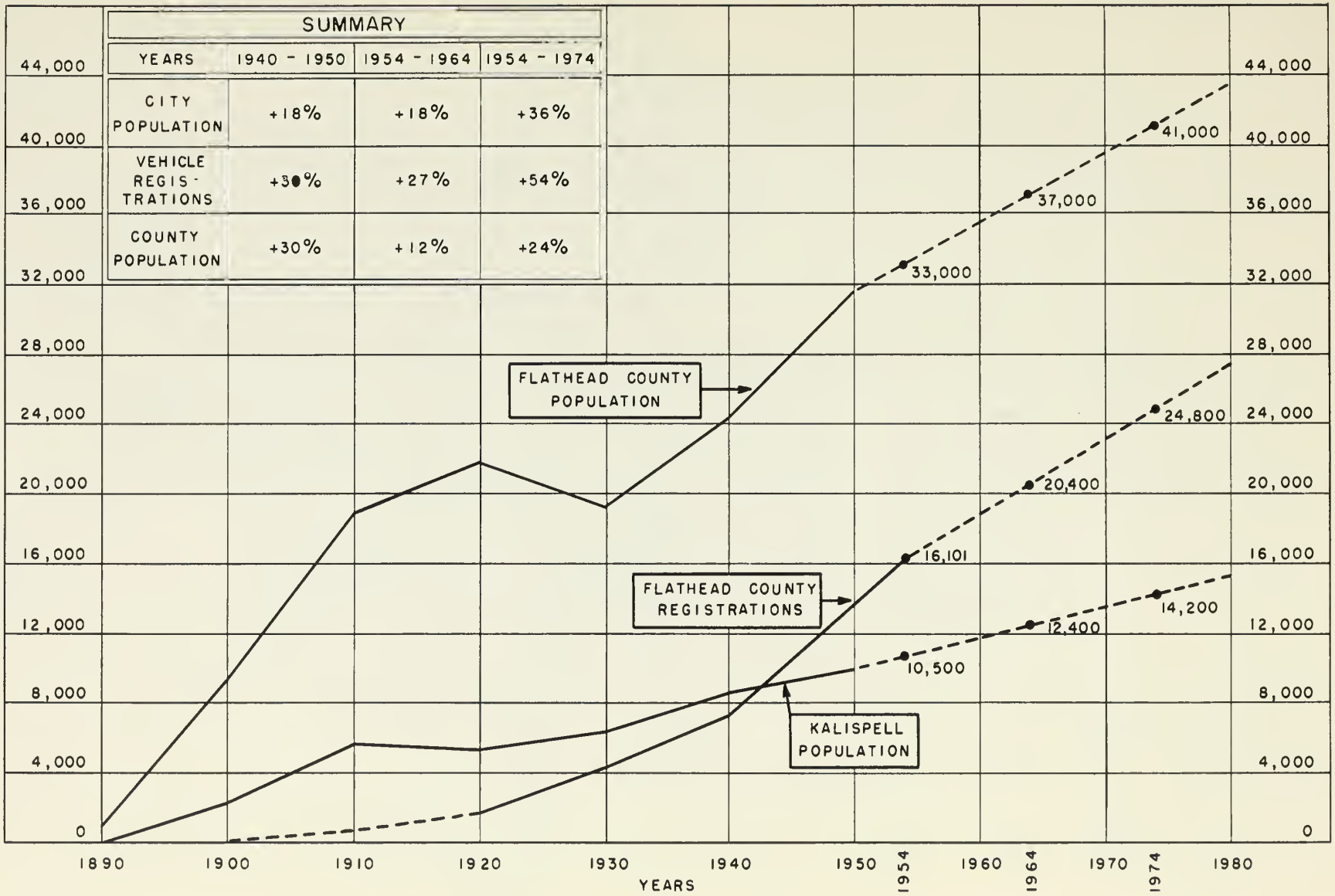
DIAGRAMMATIC MAP
OF
MONTANA

KALISPELL TRAFFIC SURVEY

VICINITY MAP

Plate 3

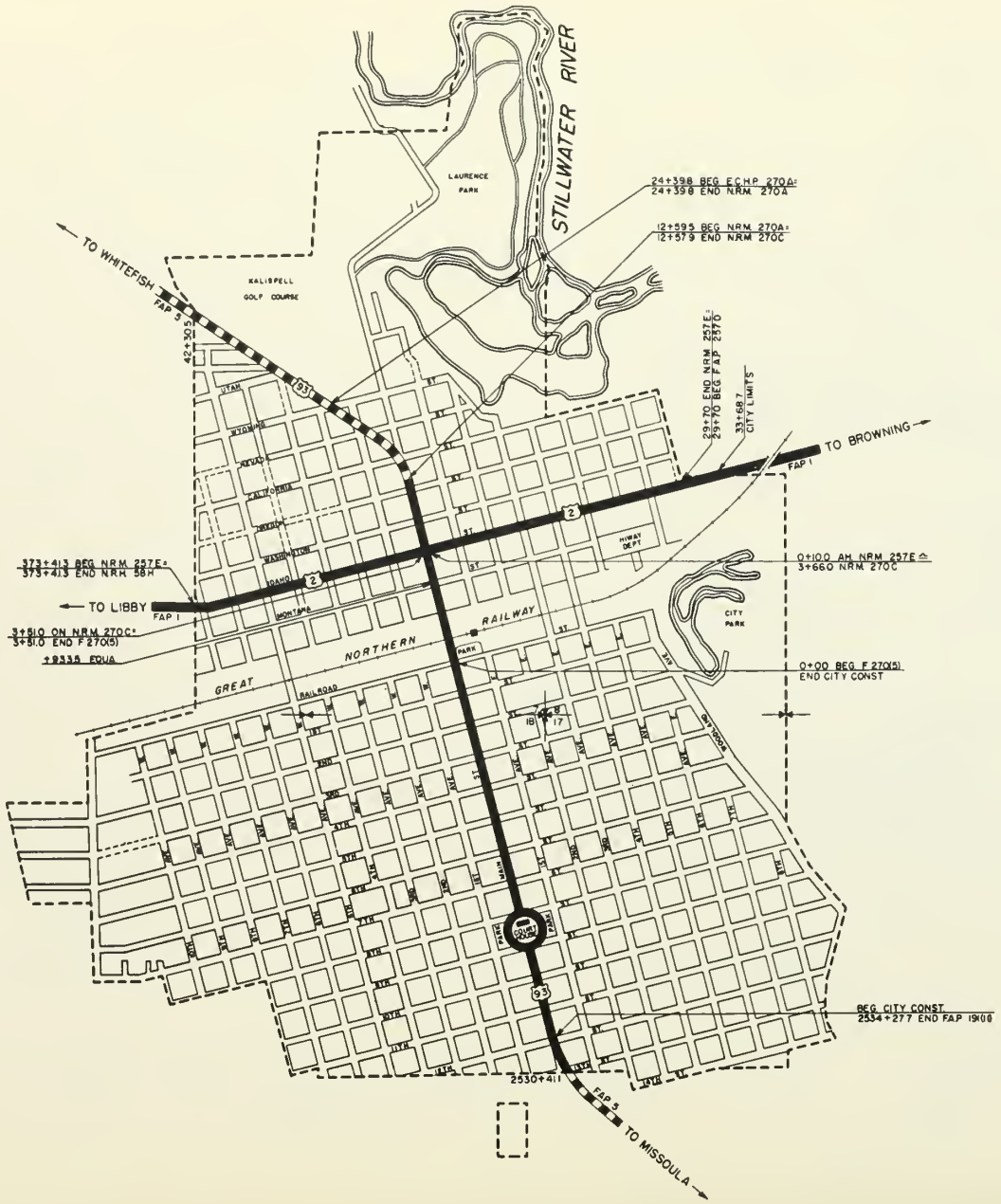
KALISPELL TRAFFIC SURVEY
POPULATION AND MOTOR VEHICLE TRENDS
KALISPELL AND FLATHEAD COUNTY



SUMMARY

YEARS	1940 - 1950	1954 - 1964	1954 - 1974
CITY POPULATION	+18%	+18%	+36%
VEHICLE REGIS-TRATIONS	+30%	+27%	+54%
COUNTY POPULATION	+30%	+12%	+24%

Plate 4



LEGEND

PRIMARY & SECONDARY SYSTEMS

ROAD TYPES

- UNIMPROVED
- GRADED AND DRAINED
- GRAVEL OR STONE
- BITUMINOUS SURFACE-LOW TYPE
- PAVED
- FAP — FEDERAL-AID PRIMARY SYSTEM
- FAS — FEDERAL-AID SECONDARY SYSTEM
- 10 — U.S. NUMBERED ROUTES
- 27 — STATE NUMBERED ROUTES
- RAILROAD AND STATION
- CORPORATE BOUNDARY LINE
- NON-EXISTENT DEDICATED STREETS
- CENTRAL BUSINESS DISTRICT
- URBAN EXTENSION BOUNDARY

N

T 28 N — R. 21 W

CITY PLAT

KALISPELL
FLATHEAD COUNTY
MONTANA

1950 CENSUS 9,737

SCALE IN FEET

1000 0 1000 2000

REV JAN 1955

Plate 5

KALISPELL TRAFFIC SURVEY

LAND USE

WITHIN
CORPORATE LIMITS

JULY 1954

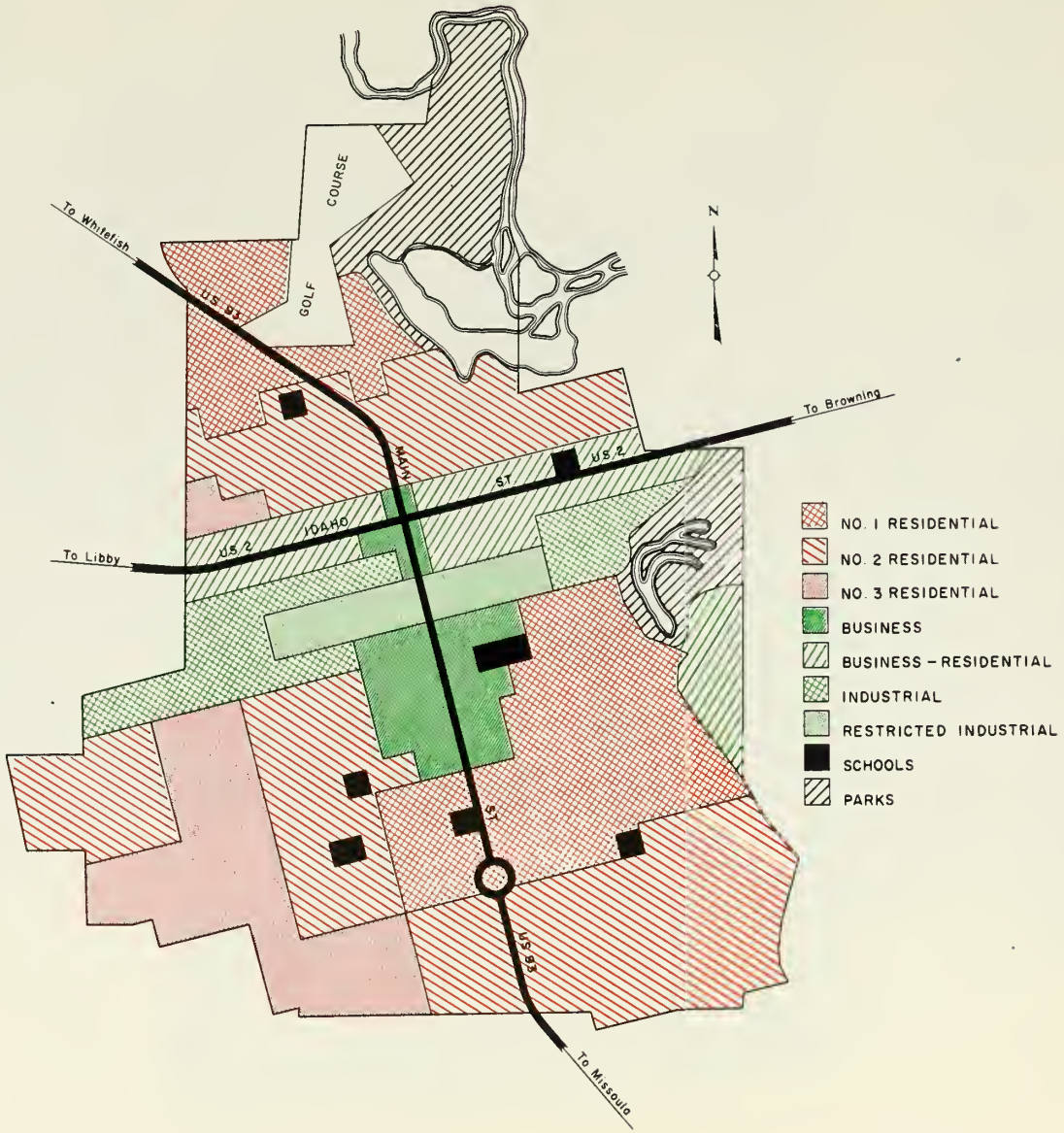
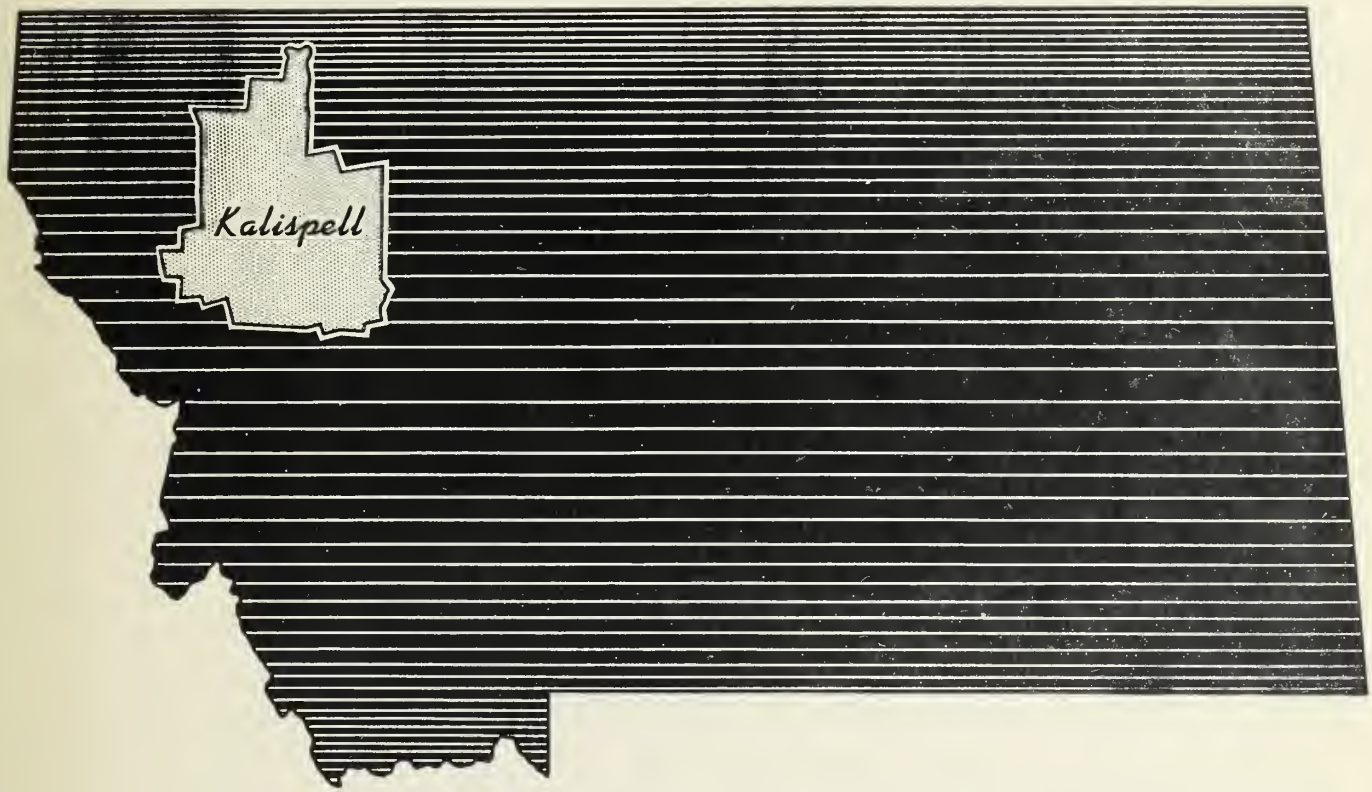


Plate 6

Main Street -- 1954

Part One



Traffic Volumes

TRAFFIC VOLUMES

In any analysis of a traffic problem it is necessary that adequate current data be available concerning the traffic patterns and habits in the area being studied. The following charts graphically present various data on hourly and daily traffic patterns in the Kalispell urban area.

Plate 7 illustrates the daily and peak hour traffic volumes as recorded on Main Street from August 10 - 23, 1954. It will be noted that the peak hour occurred between 4:45 and 5:45 P.M. and that 7.8 per cent of the total 24 hour traffic volume is on the streets of Kalispell during this one hour.

Plate 8 graphically illustrates the hourly traffic volume patterns for an average weekday, Saturday, and Sunday as recorded at the master station on Main Street. Traffic variation between days of the week and the hourly percentage of an average weekday are shown on Plate 9. Mondays and Tuesdays are apparently very close to average weekdays with Wednesdays and Thursdays low and Fridays 7 per cent above average. Saturdays were 32 per cent higher than the average weekday in August of 1954.

The thirtieth highest hour of traffic occurring during the year has generally been accepted as a volume for which a highway or street facility can be most practically designed. Due to the lack of continuous counts in most cities, a method has been devised to approximate the 30th highest hour by the use of short counts.

Plate 10 illustrates the method that has been used to approximate the 30th maximum hour in Kalispell where continuous counts were not available. Fourteen highest recorded hourly volumes were plotted and the design hour selected at a point where the curve began to definitely level off. This design hour should approximate the 30th maximum hour of traffic in Kalispell and has been used in computing the traffic capacities of existing streets.

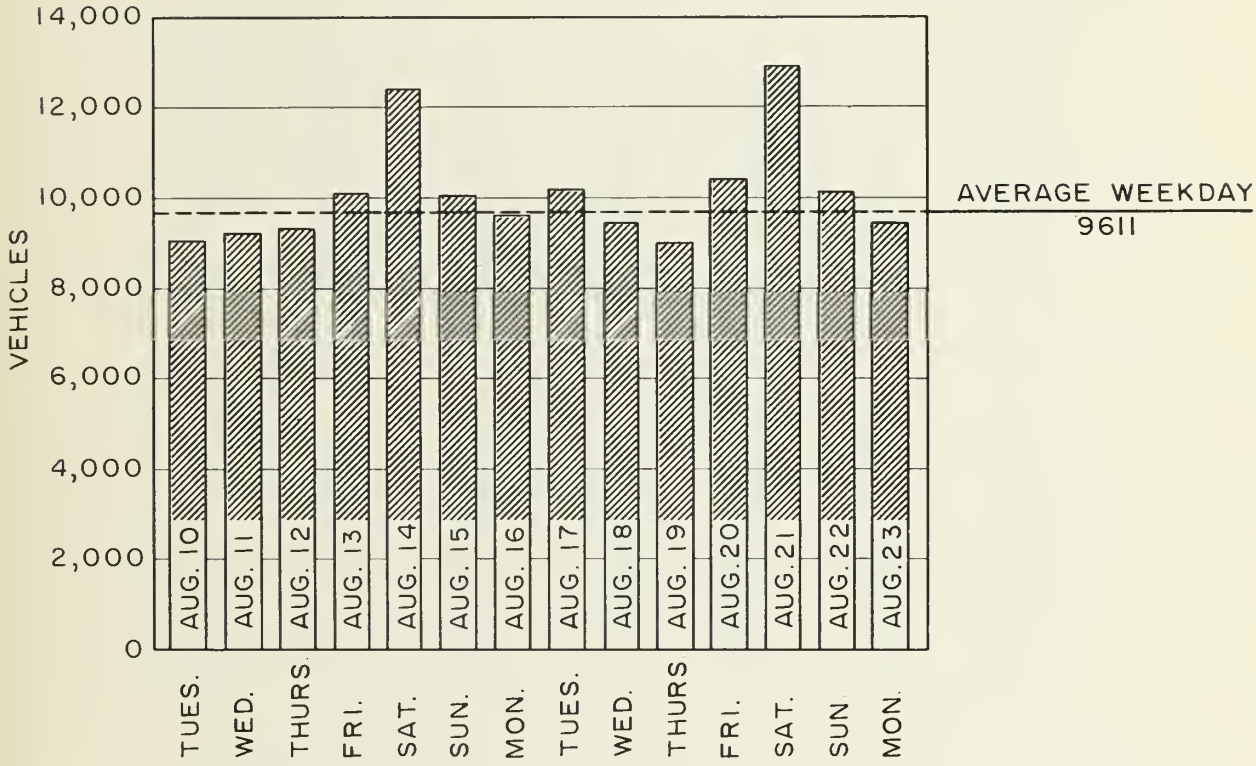
Plate 11 has been prepared to show the traffic flow on the principal streets in Kalispell during the peak hour. Traffic volumes shown on this chart represent about 7.8 per cent of the average 24 hour volumes for August 1954.

KALISPELL TRAFFIC SURVEY

MECHANICALLY RECORDED TRAFFIC VOLUMES

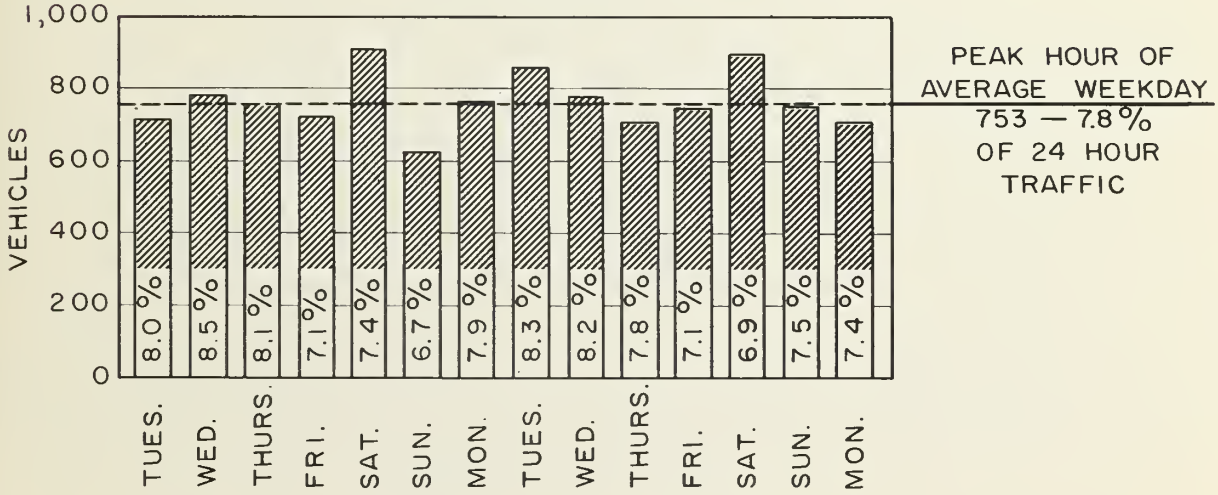
MAIN STREET—U.S. 93

AUGUST 10–23, 1954



PEAK HOUR TRAFFIC VOLUMES

4:45–5:45 P.M.



KALISPELL TRAFFIC SURVEY

HOURLY TRAFFIC VOLUME PATTERNS

MAIN STREET—U.S. 93

AUGUST 10-23, 1954

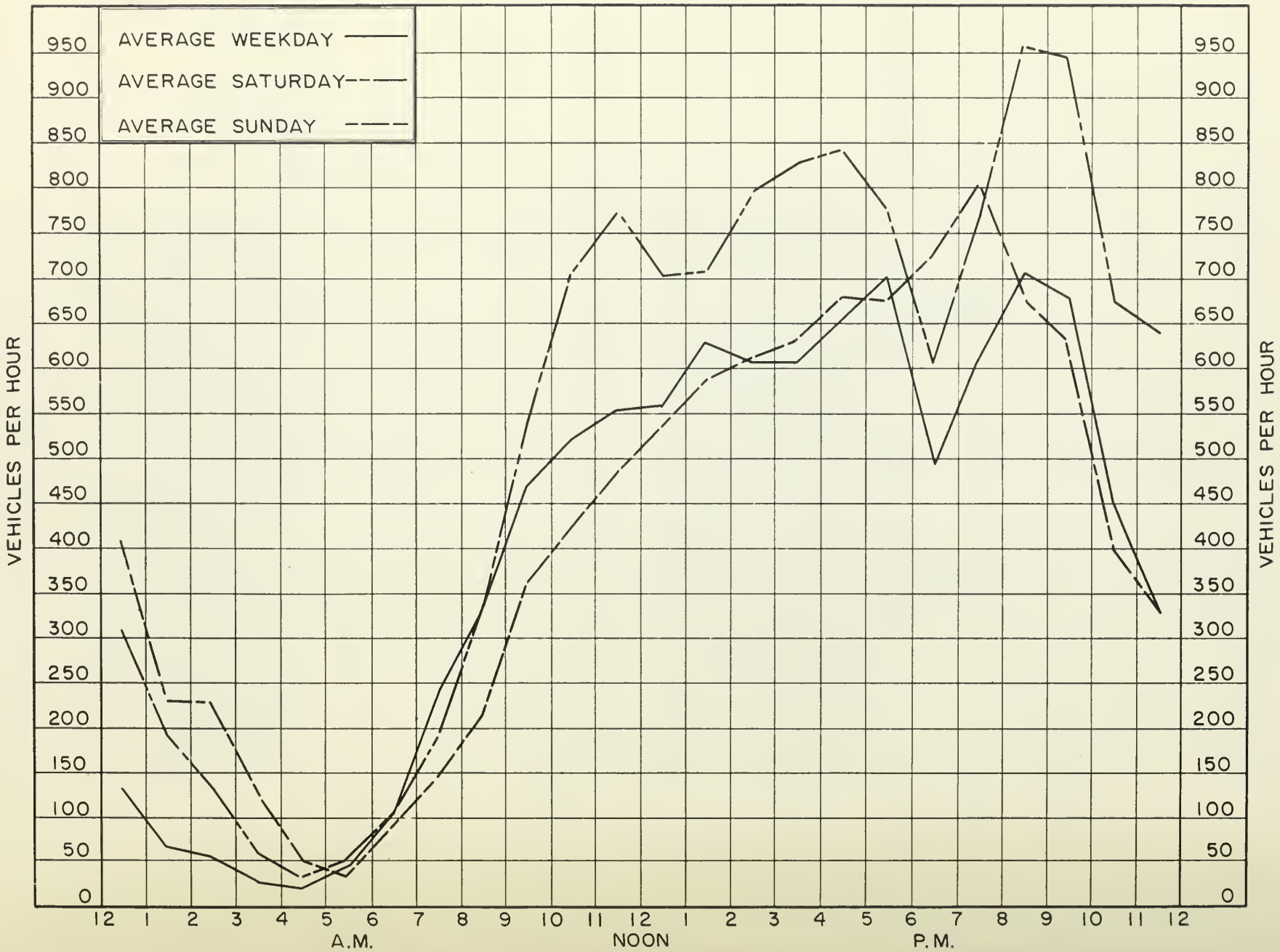
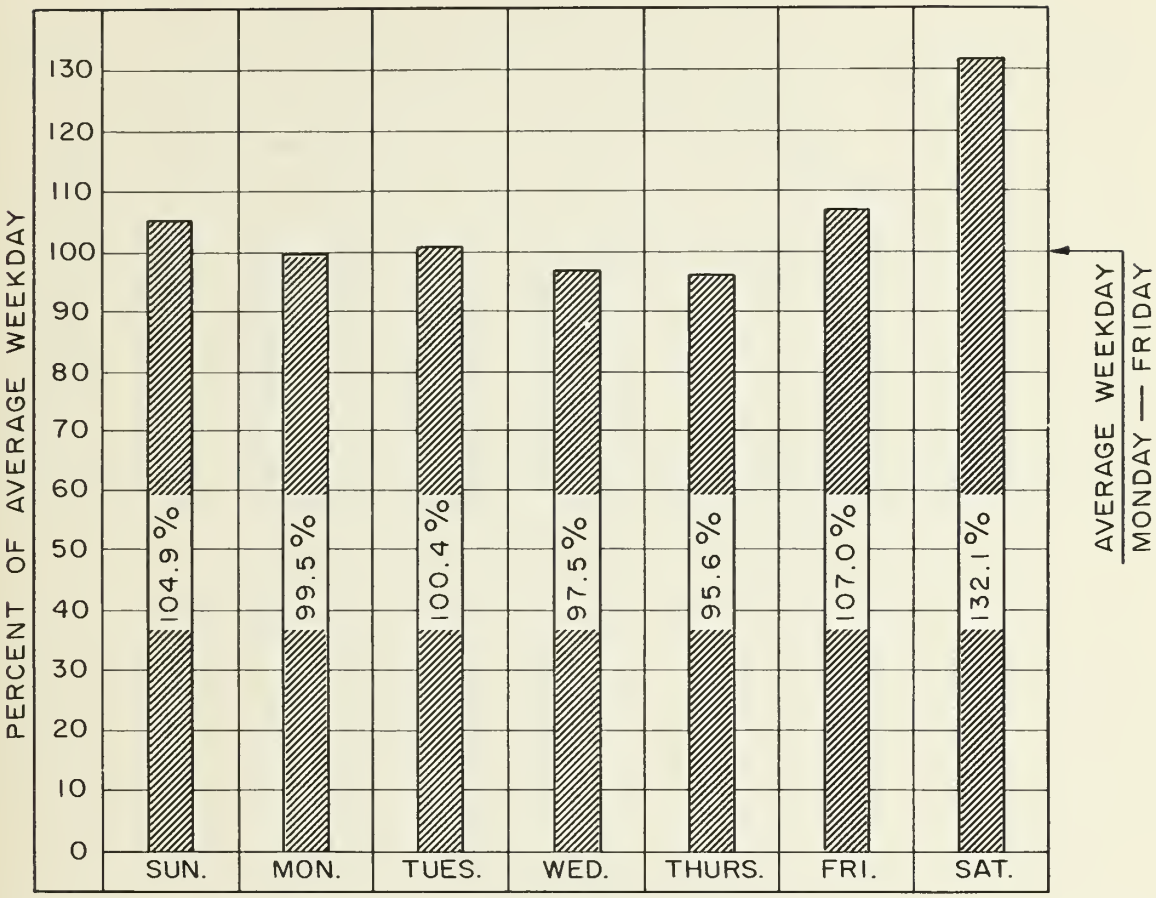


Plate 8

KALISPELL TRAFFIC SURVEY
DAILY VARIATION AND HOURLY PERCENTAGE
MAIN STREET–U.S. 93
AUGUST 10–23, 1954



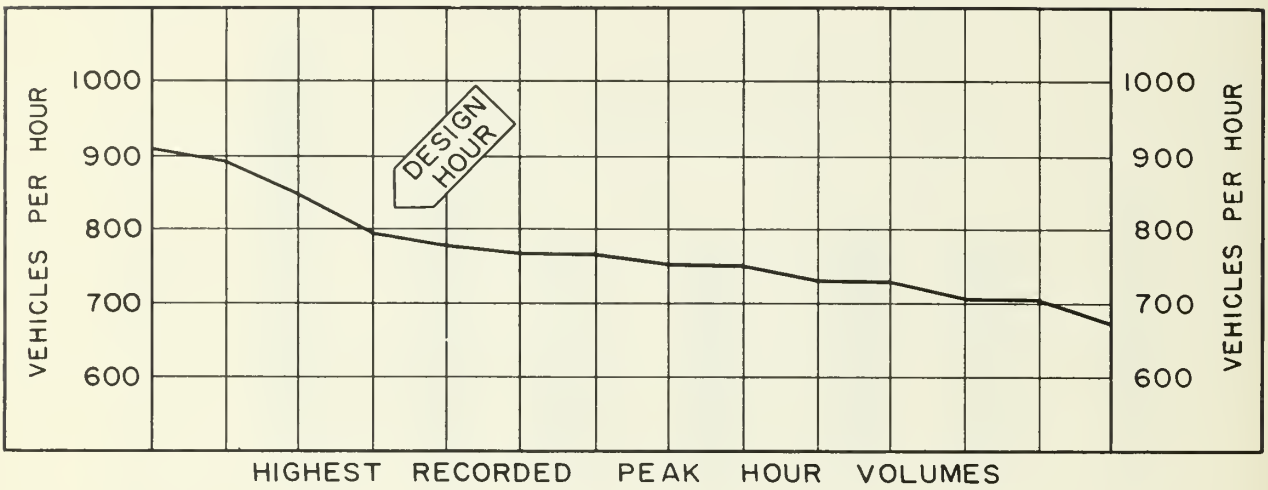
HOURLY PERCENTAGE OF AVERAGE WEEKDAY

HOURS A.M.	PERCENT	HOURS P.M.	PERCENT
12-1	1.4	12-1	5.9
1-2	0.7	1-2	6.5
2-3	0.6	2-3	6.3
3-4	0 3	3-4	6.3
4-5	0 2	4-5	6.8
5-6	0.4	5-6	7 3
6-7	1.1	6-7	5.1
7-8	2.5	7-8	6.3
8-9	3.3	8-9	7.5
9-10	4.9	9-10	7.1
10-11	5.5	10-11	4.8
11-12	5.8	11-12	3.4

KALISPELL TRAFFIC SURVEY

PEAK HOUR VOLUMES AND DESIGN HOUR

4:30 — 5:30 P.M.



RECORDED PEAK HOUR VOLUMES (4:45 — 5:45 P.M.)
ON MAIN STREET
BETWEEN 1ST. AND 2ND. STS. SO.

NO.	DAY	DATE	PEAK HOUR VOLUME	DESIGN FACTOR	
1	SATURDAY	AUG. 14	913	0.87	
2	SATURDAY	AUG. 21	894	0.88	
3	TUESDAY	AUG. 17	849	0.93	
4	WEDNESDAY	AUG. 11	790	1.00	Design Hour
5	WEDNESDAY	AUG. 18	778	1.02	
6	SUNDAY	AUG. 22	764	1.03	
7	MONDAY	AUG. 16	761	1.04	
8	THURSDAY	AUG. 12	756	1.04	
9	FRIDAY	AUG. 20	743	1.06	
10	FRIDAY	AUG. 13	726	1.09	
11	TUESDAY	AUG. 10	725	1.09	
12	THURSDAY	AUG. 19	704	1.12	
13	MONDAY	AUG. 23	702	1.13	
14	SUNDAY	AUG. 15	675	1.17	

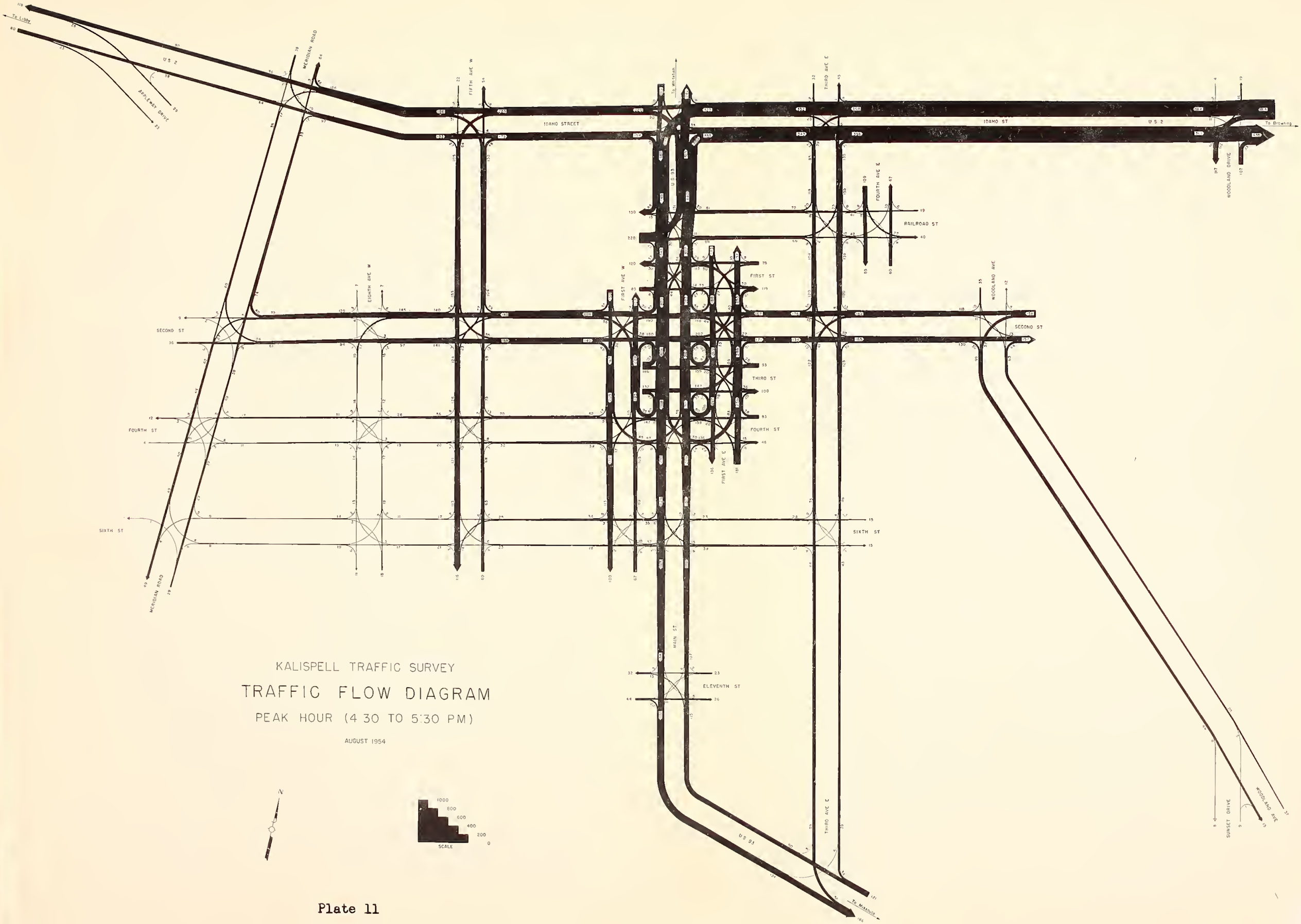
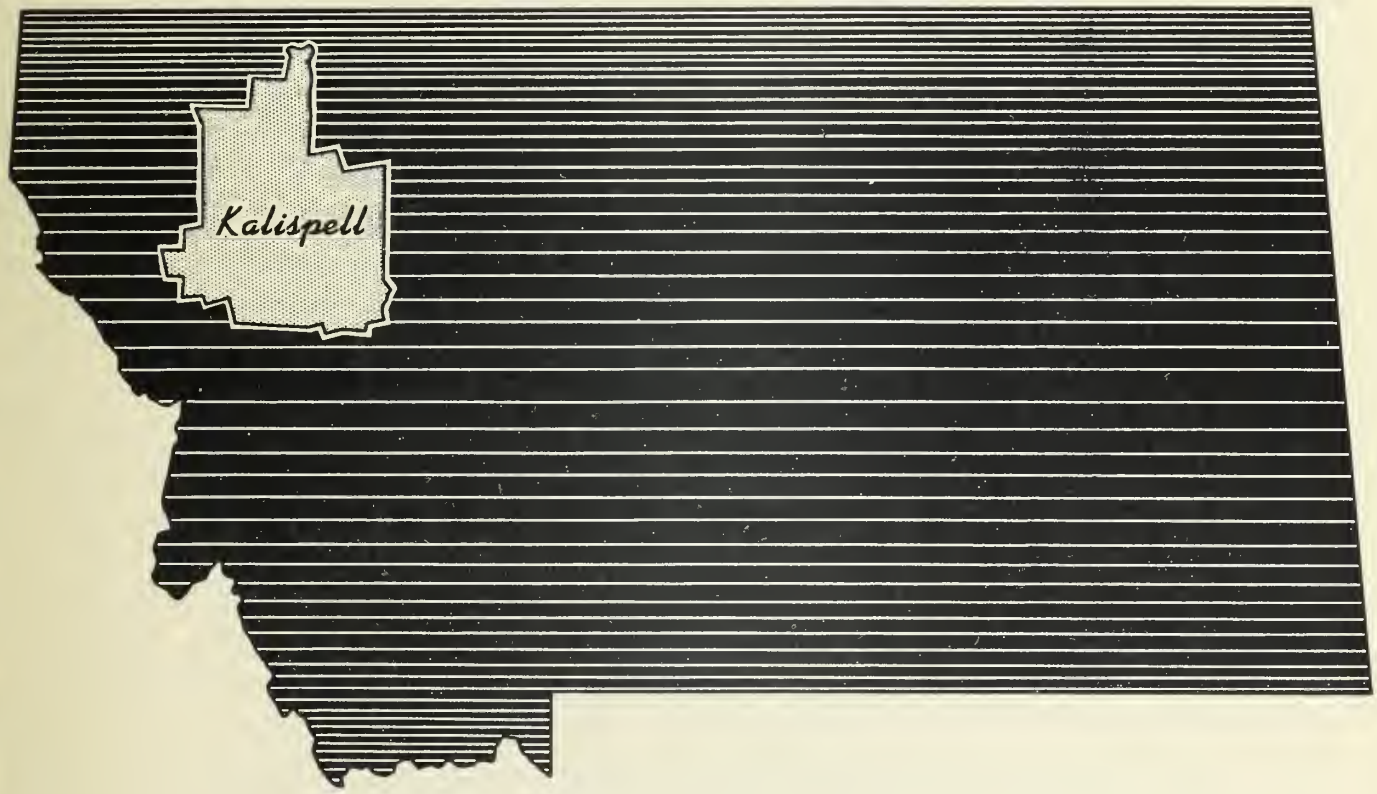

KALISPELL TRAFFIC SURVEY
TRAFFIC FLOW DIAGRAM
PEAK HOUR (4 30 TO 5:30 PM)
AUGUST 1954
To Libby
U S 2
APPLEWAY DRIVE
MERIDIAN ROAD
FIFTH AVE W
IDAHO STREET
To Whitefish
THIRD AVE E
IDAHO ST
To Browning
WOODLAND DRIVE
FOURTH AVE E
RAILROAD ST
EIGHTH AVE W
FIRST AVE W
FIRST ST
WOODLAND AVE
SECOND ST
THIRD ST
FOURTH ST
FIRST AVE E
SIXTH ST
MAIN ST
ELEVENTH ST
THIRD AVE E
U S 93
To Marion
SUNSET DRIVE
WOODLAND AVE
N
SCALE
1000
800
600
400
200
0

Plate 11

Part Two



Parking Study

PARKING STUDY

An abbreviated parking study was conducted in the central business district of Kalispell to determine how critical the parking problem has become. Such items as parking supply, peak hour of vehicle accumulation, spot counts of parked vehicles, and the parking turnover on representative blocks were studied and the results presented on the following charts.

PARKING INVENTORY

An inventory of all parking facilities in the business district as of August 1954 is shown on Plate 12 and a summary of these facilities is tabulated below:

UNMETERED CURB	METERED CURB	PARKING LOTS	TOTAL
553	709	1085	2347

PARKING DEMAND

The peak hour of vehicle accumulation in the business district was determined by taking manual directional counts on a cordon line surrounding the district. The hourly difference between inbound and outbound vehicles was added or subtracted to the number parked in the area at 10 A.M. to determine the peak hour of vehicle accumulation. It was found that the maximum number of vehicles accumulated in the area at 11 A.M. and that this number held practically constant until about 5 P.M. when most of them left the downtown area.

Spot counts of parked vehicles in the area were made between 10 and 11 A.M. and 2 and 3 P.M. on Friday, August 20, 1954. The results of these counts are shown on Plates 14 and 15. It was found that in four blocks during each of the peak hours the vehicles parked at the curb equalled or exceeded the number of legal spaces. In the entire 24 block area however, during the peak hour curb parking spaces were filled to only 66 per cent of capacity and lot spaces to 53 per cent of capacity. It will be noted from these charts that there generally was ample curb space available within two blocks to the west and south of the principal business frontage when angle parking was in

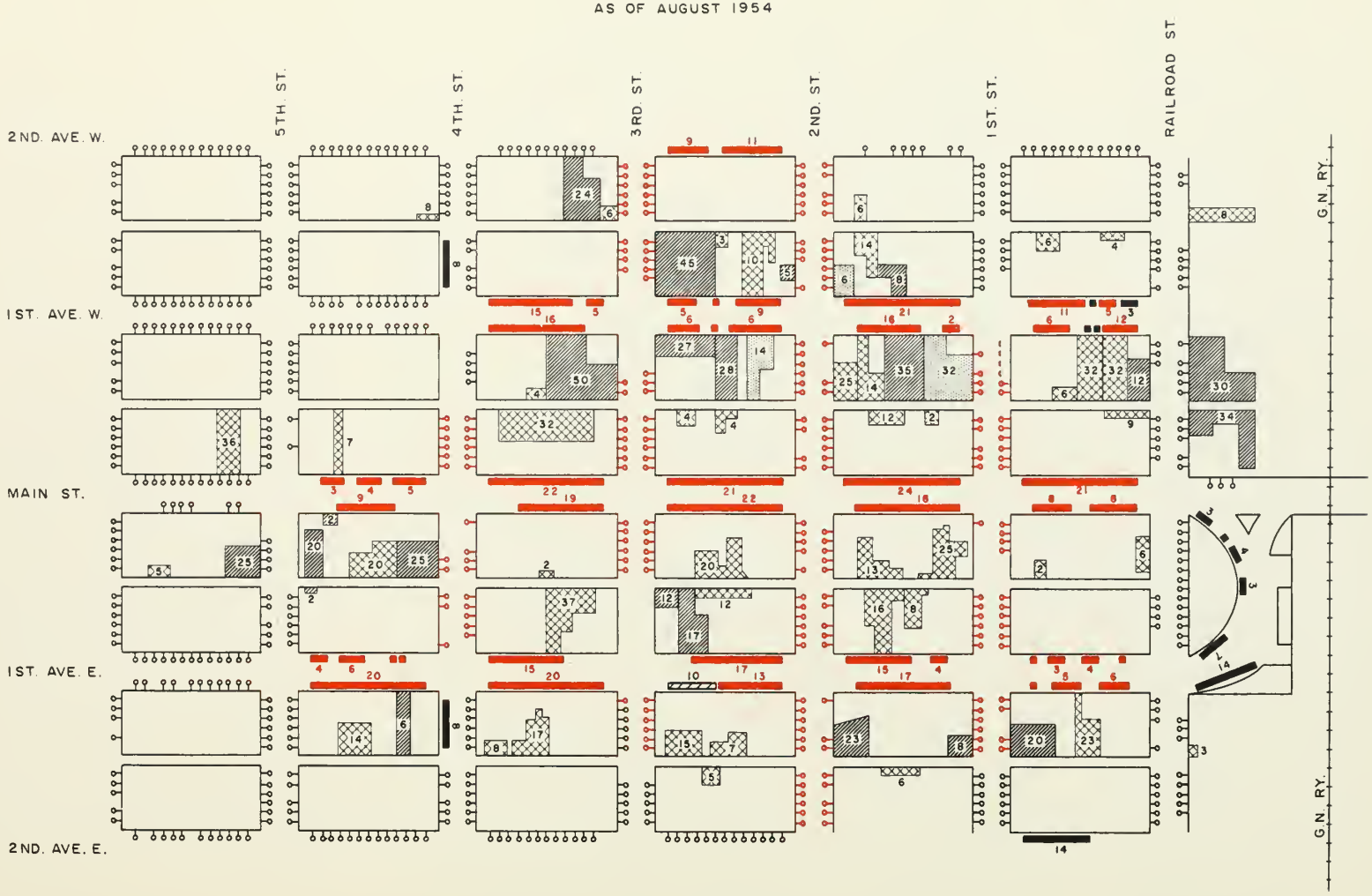
use on Main Street and First Avenue East. The change to parallel parking on these streets has meant the loss of about 140 curb spaces which should be compensated for by off street public lots. One public lot with a capacity of 40 cars and one customer lot with about the same capacity have been established since parallel parking has been in effect. It is estimated that 100 additional off street spaces in public lots within two blocks of the principal business frontage should be ample to satisfy present parking demands.

PARKING TURNOVER

A study was made of the parking turnover in downtown Kalispell by selecting two representative blocks fronting on Main Street. Data on parking turnover were obtained by having a recorder inventory all vehicles parked at the curb and note license numbers every fifteen minutes from 10 A.M. - 6 P.M. By this method the length of time parked, the number of vehicles parked in each space, and such related items as the number of meter and parking violations were obtained. The results of this study are compiled on Plates 16 and 17. The average time parked at the two hour meters was found to be 52 minutes in Block 10 and 53 minutes in Block 14. Approximately 28 per cent of the total number of vehicles parked for over one hour in each block but they used 61 per cent of the total space hours available in Block 10 and 75 per cent of the total space hours available in Block 14. Parking turnover varied from 8.2 to 1.9 vehicles per space during the 8 hours from 10 A.M. - 6 P.M.

KALISPELL TRAFFIC SURVEY
LOCATION AND PARKING CAPACITY
STREETS AND LOTS

AS OF AUGUST 1954



LEGEND

OFF STREET PARKING

- PUBLIC LOTS
- PRIVATE LOTS
- CUSTOMER LOTS

STREET FREE PARKING

- UNRESTRICTED PARALLEL
- UNRESTRICTED ANGLE
- 15 MINUTE ANGLE

STREET METERED PARKING

- 2 HOUR PARALLEL
- 2 HOUR ANGLE

Plate 12

KALISPELL TRAFFIC SURVEY
ALL VEHICLES ENTERING OR LEAVING CORDON AREA
AVERAGE WEEKDAY - AUGUST 1954
10 A.M. - 6 P.M.

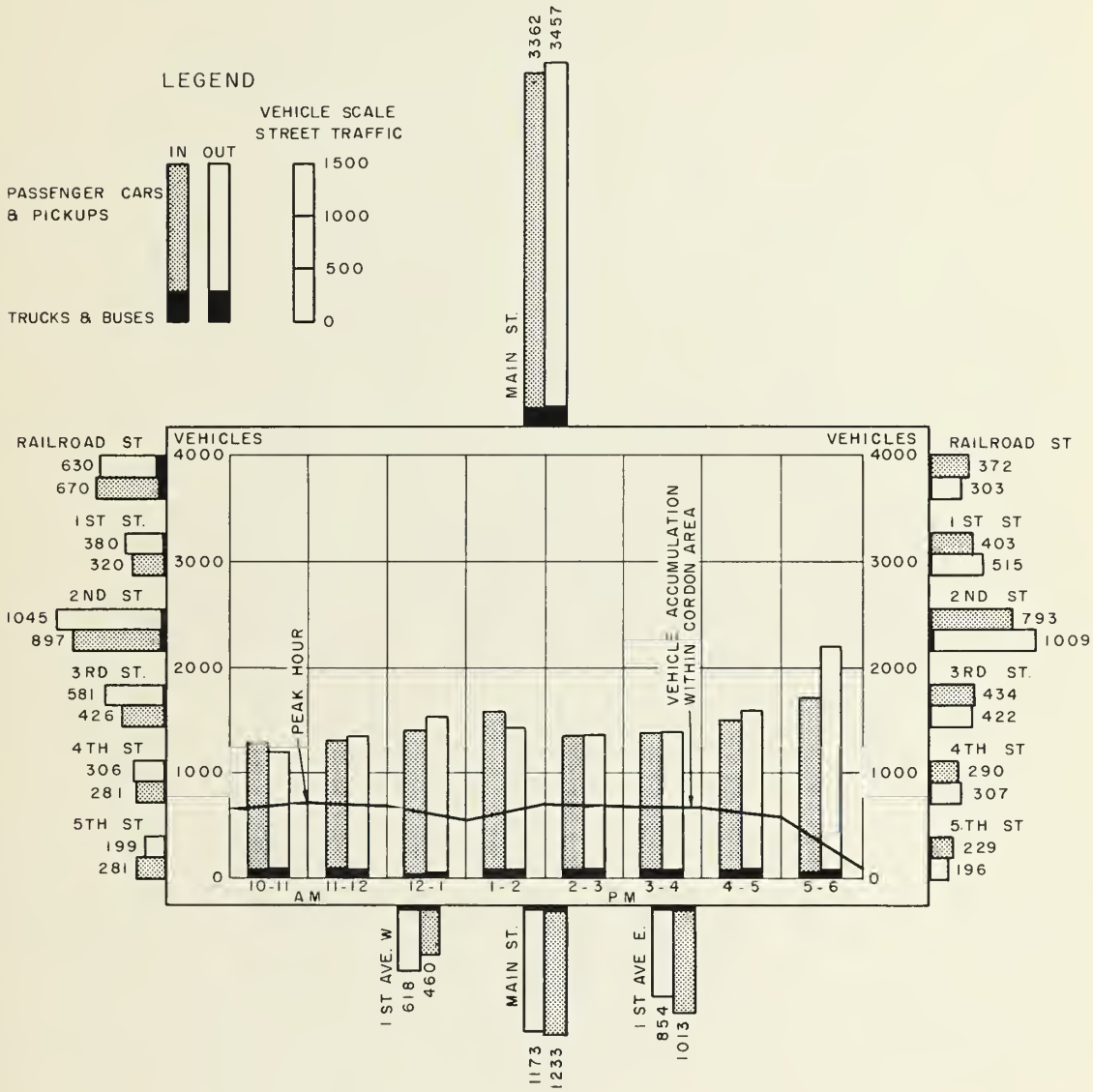


Plate 13

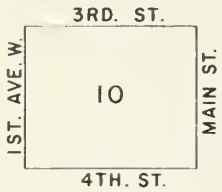
KALISPELL TRAFFIC SURVEY
CURB SPACE OCCUPANCY
10:00 TO 11:00 A.M.
FRIDAY - AUGUST 1954

Plate 14

KALISPELL TRAFFIC SURVEY
CURB SPACE OCCUPANCY
2:00 TO 3:00 P.M.
FRIDAY - AUGUST 1954

Plate 15

KALISPELL TRAFFIC SURVEY
CURB PARKING CHARACTERISTICS
CENTRAL BUSINESS DISTRICT

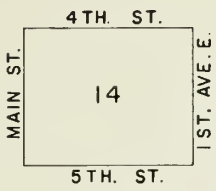


	NORTH FACE 3RD ST.	EAST FACE MAIN ST.	SOUTH FACE 4TH ST.	WEST FACE 1ST AVE. W.	TOTAL
NUMBER OF UNRESTRICTED SPACES			4		4
NUMBER OF 2 HOUR METERS	8	22	6	16	52
NUMBER OF VEHICLES PARKED IN LEGAL SPACES (UNRESTRICTED)			11		11
AVERAGE TIME PARKED MINUTES (UNRESTRICTED)			124		124
NUMBER OF VEHICLES PARKED IN LEGAL SPACES (2 HOUR METERS)	61	180	51	34	326
AVERAGE TIME PARKED MINUTES (2 HOUR METERS)	55	54	46	50	52
TOTAL SPACE HOURS AVAILABLE (ALL METERS AND SPACES)	64	176	80	128	448
SPACE HOURS USED (ALL METERS AND SPACES)	55.75	161.25	61.50	28.50	307.00
PER CENT OF AVAILABLE SPACE HOURS USED	87.1	91.6	76.9	22.3	68.5
NUMBER OF VEHICLES PARKED OVER 1 HOUR	18	46	17	11	92
NUMBER OF VEHICLES PARKED *ILLEGALLY	1				1
HOURS OF ILLEGAL PARKING	0.50				0.50
NUMBER OF METER VIOLATIONS	24	66	24	11	125
HOURS OF METER VIOLATIONS	17.00	27.50	10.25	6.25	61.00
PER CENT OF VEHICLES PARKING OVER 1 HOUR	29.5	25.6	27.4	32.4	27.3
PER CENT OF SPACE HOURS USED BY VEHICLES PARKING OVER 1 HOUR	61.0	59.2	63.4	71.9	61.6
PARKING TURNOVER 10 A.M. - 6 P.M. (VEHICLES/SPACE/DAY)	7.6	8.2	6.2	2.1	6.0

*END ZONES, FIRE PLUGS, DOUBLE PARK, ETC.

DURATION OF PARKING	PER CENT OF TOTAL VEHICLES PARKED				
15 MINUTES OR LESS	29.5	32.8	33.9	47.1	33.8
16 MINUTES TO 30 MINUTES	19.7	19.5	12.9	17.6	18.1
31 MINUTES TO 1 HOUR	21.3	22.2	25.8	2.9	20.8
61 MINUTES TO 2 HOURS	23.0	14.4	17.7	20.6	17.2
OVER 2 HOURS	6.5	11.1	9.7	11.8	10.1
MAXIMUM TIME PARKED (HOURS)	4.25	4.50	7.25	3.25	7.25

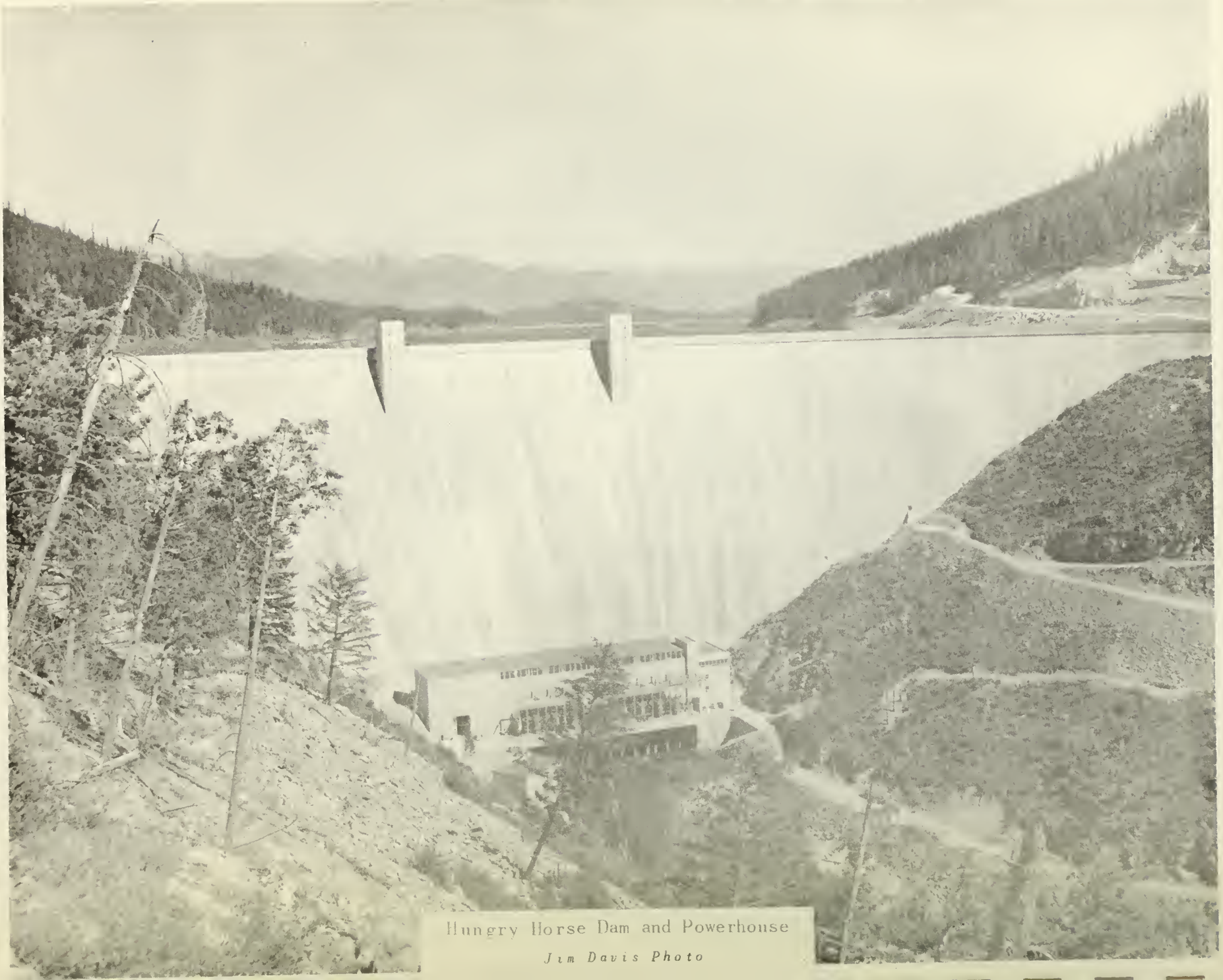
KALISPELL TRAFFIC SURVEY
CURB PARKING CHARACTERISTICS
CENTRAL BUSINESS DISTRICT



	NORTH FACE 4TH ST.	EAST FACE 1ST AVE. E.	SOUTH FACE 5TH ST.	WEST FACE MAIN ST.	TOTAL
NUMBER OF UNRESTRICTED SPACES	2	3	13	3	21
NUMBER OF 2 HOUR METERS	4	12		9	25
NUMBER OF VEHICLES PARKED IN LEGAL SPACES (UNRESTRICTED)	6	3	25	3	37
AVERAGE TIME PARKED MINUTES (UNRESTRICTED)	95	310	116	265	140
NUMBER OF VEHICLES PARKED IN LEGAL SPACES (2 HOUR METERS)	24	44		57	125
AVERAGE TIME PARKED MINUTES (2 HOUR METERS)	66	59		43	53
TOTAL SPACE HOURS AVAILABLE (ALL METERS AND SPACES)	48	120	104	96	368
SPACE HOURS USED (ALL METERS AND SPACES)	35.75	58.00	48.25	54.50	196.50
PER CENT OF AVAILABLE SPACE HOURS USED	74.5	48.3	46.4	56.8	53.4
NUMBER OF VEHICLES PARKED OVER 1 HOUR	5	12	15	15	47
NUMBER OF VEHICLES PARKED *ILLEGALLY	2	6			8
HOURS OF ILLEGAL PARKING	4.75	12.50			17.25
NUMBER OF METER VIOLATIONS	6	26		26	58
PER CENT OF VEHICLES PARKING OVER 1 HOUR	16.7	25.5	60.0	25.0	29.0
PER CENT OF SPACE HOURS USED BY VEHICLES PARKING OVER 1 HOUR	65.7	74.6	91.2	68.8	75.4
PARKING TURNOVER 10 A.M. - 6 P.M. (VEHICLES/SPACE/DAY)	5.0	3.1	1.9	5.0	3.5

*END ZONES, FIRE PLUGS, DOUBLE PARK, ETC.

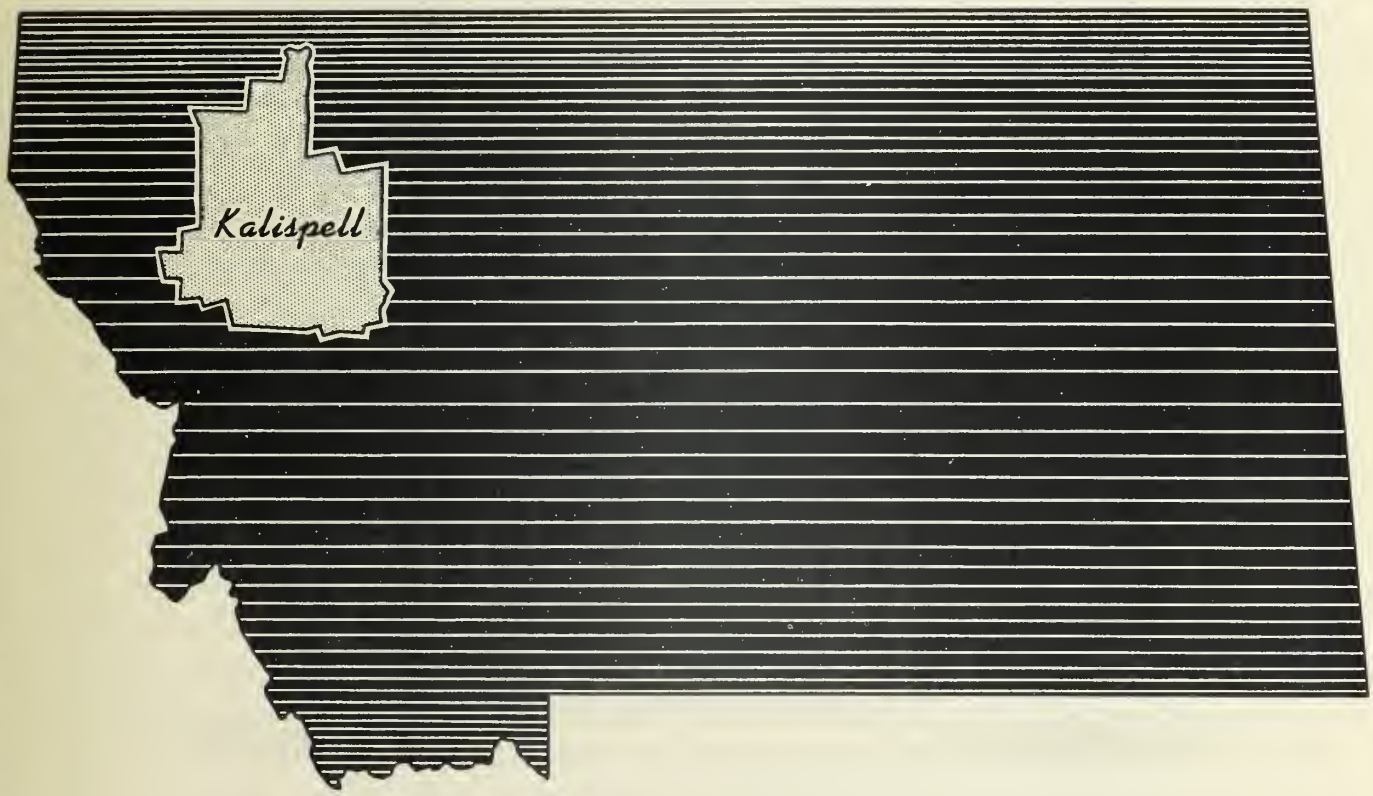
DURATION OF PARKING	PER CENT OF TOTAL VEHICLES PARKED				
15 MINUTES OR LESS	43.3	42.6	28.0	45.0	41.4
16 MINUTES TO 30 MINUTES	16.7	19.1		25.0	17.9
31 MINUTES TO 1 HOUR	23.3	12.8	12.0	5.0	11.7
61 MINUTES TO 2 HOURS	3.3	6.4	28.0	15.0	12.3
OVER 2 HOURS	13.4	19.1	32.0	10.0	16.7
MAXIMUM TIME PARKED (HOURS)	7.75	7.75	6.75	6.75	7.75



Hungry Horse Dam and Powerhouse

Jim Davis Photo

Part Three



Speed & Delay Studies
&
Urban Route Analyses

SPEED AND DELAY STUDIES
AND
URBAN ROUTE ANALYSES

SPEED AND DELAY STUDIES

A series of speed and delay studies were conducted in Kalispell on Main Street between 6th and Idaho Streets and on Idaho Street between 5th Avenue West and 3rd Avenue East. The purpose of these studies was to determine the amount, cause, location, and duration of traffic delays as well as over all vehicular speeds. Peak hour observations were made between 4:30 and 5:30 P.M. and off peak between 10 and 11 A.M.

Field work was accomplished by using a passenger car to *float* with the traffic for a minimum of five runs in each direction over each route. Any delay that reduced speeds to under five miles per hour was timed, classified, and recorded. Overall travel time between each intersection was also recorded in order that average speeds could be computed. The results of these studies are shown on plates 18 - 23, inclusive.

The City of Kalispell is to be commended for changing from angle to parrellel parking. This important change has removed the cause of much of the congestion that was apparent on Main Street during peak hours. The remaining intersectional delay can be corrected to some extent by adjusting the present signal timing.

A time-space diagram for progressive signal timing on Main Street is shown on Plate 25. The major change from the present signal timing is the proposed increase in cycle length from 50 to 55 seconds. This five second increase was allocated primarily to the cross streets in order to provide more time for the pedestrian movement and still retain a sufficiently long green interval for traffic progression on Main Street. Under the proposed plan traffic should progress through the signals on a 14 second through band at about 19 miles per hour.

After this signal timing plan is put into operation it should be tested for efficiency. Necessary adjustments can then be made to cover local conditions.

The speed and delay study taken on Idaho Street during the peak hour shows an average of 22 seconds of delay at the intersection of 3rd Avenue

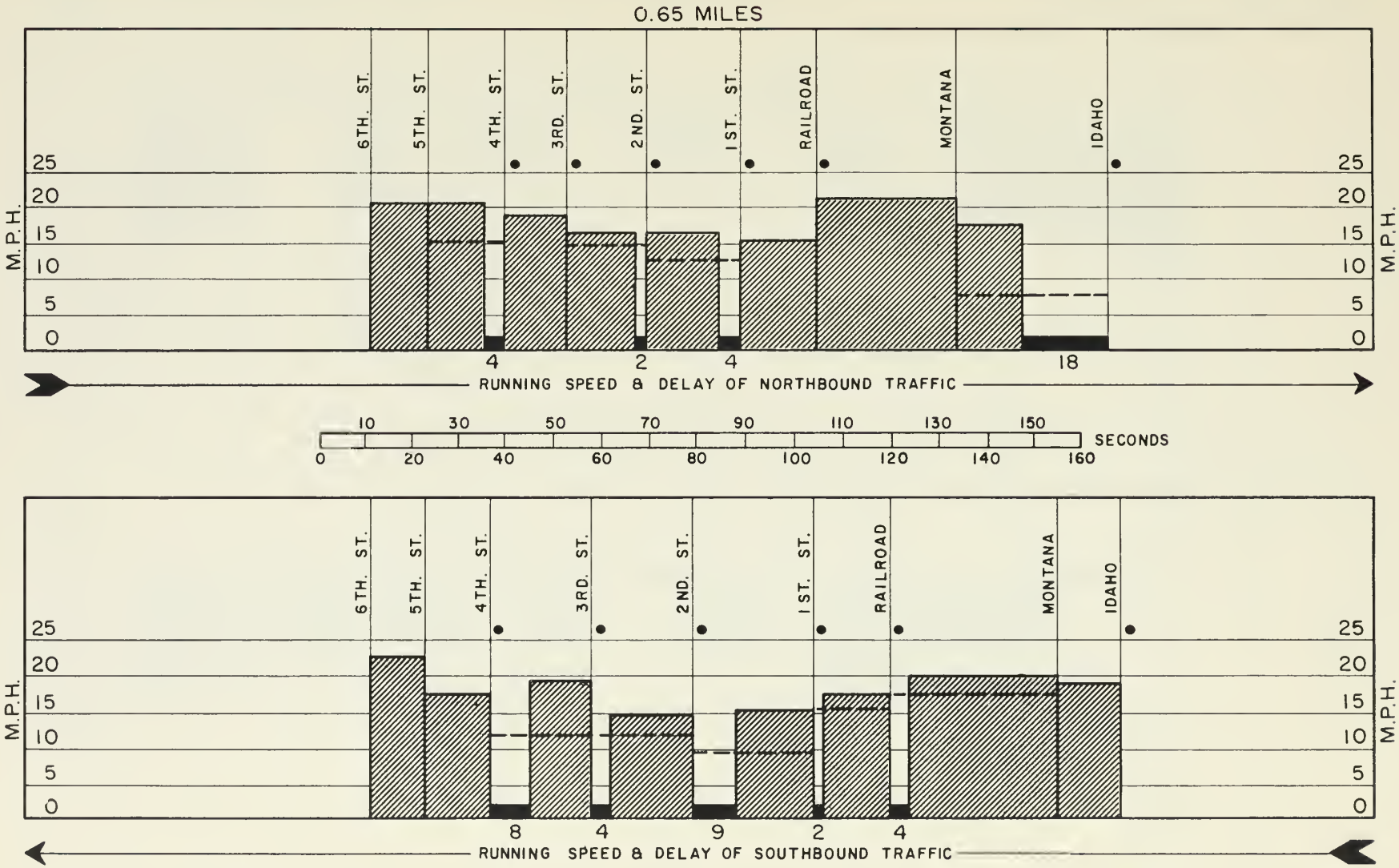
East. Much of this delay is a direct result of the intersection operating near practical traffic capacity.

A large portion of the general congestion found at this intersection however can be attributed to the present use of angle parking in front of the super market located on the southeast corner of the intersection. Vehicles, in backing out from this angle parking, very effectively block the east bound lane of traffic through the intersection. As an interim measure, until Idaho Street can be reconstructed to a four lane standard it is suggested that the angle parking be changed to parallel or prohibited entirely on the south side of Idaho between 3rd and 4th Avenues East. Parking should also be cut back for a minimum of 100 feet on all right hand approaches to the intersection to provide more space for turning movements.

URBAN ROUTE ANALYSES

The route analysis of Main Street shown on Plate 24 consists basically of a study of intersection traffic capacities and the various factors affecting this capacity such as street widths, type of parking, turning movements, amount of commercial vehicles, etc. The methods used in determining traffic capacity are detailed in the Highway Capacity Manual published by the Bureau of Public Roads. Plate 24 shows, by the red hatched areas, the intersection approaches that were operating above practical traffic capacity during August of 1954 due primarily to the use of angle parking. The change to parallel parking has increased the effective street width by 20 feet and the traffic capacity by approximately 40 per cent. It is estimated that this facility will now be adequate for any future traffic volumes which can be anticipated in the next 10 to 15 years.

KALISPELL TRAFFIC SURVEY
OFF PEAK HOUR SPEED & DELAY
MAIN ST. — FROM 6TH. ST. S. TO IDAHO ST.



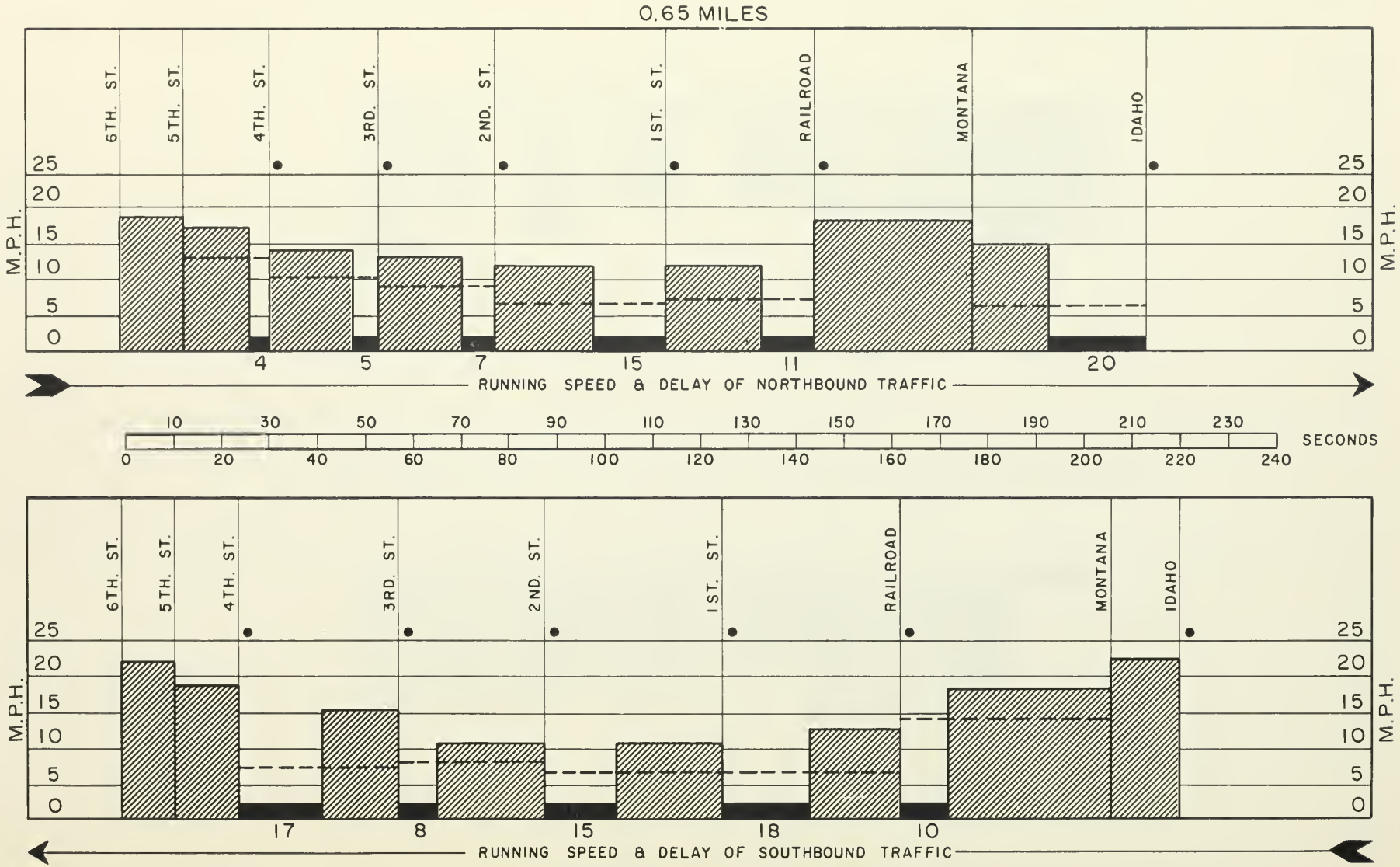
LEGEND

- AVERAGE RUNNING SPEED
- AVERAGE OVERALL SPEED
- AVERAGE STANDING DELAY
- 6 NUMBER OF SECONDS
- • SIGNAL LOCATION

OFF PEAK HOUR SUMMARY

	NORTHBOUND	SOUTHBOUND
TOTAL RUNNING TIME	2 Min. 34 Sec.	1 Min. 12 Sec.
TOTAL STANDING DELAY	28 Seconds	27 Seconds
AVERAGE OVERALL SPEED	15.2 M.P.H.	15.0 M.P.H.

KALISPELL TRAFFIC SURVEY
PEAK HOUR SPEED & DELAY
MAIN ST. — FROM 6TH. ST. S. TO IDAHO ST.



LEGEND

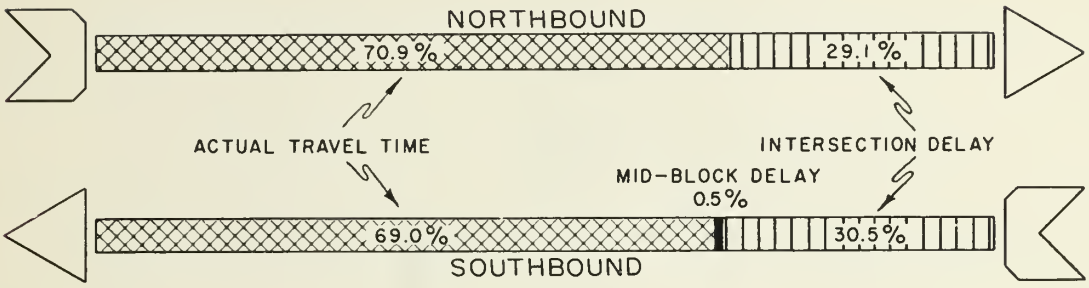
- AVERAGE RUNNING SPEED
- AVERAGE OVERALL SPEED
- AVERAGE STANDING DELAY
- 6 NUMBER OF SECONDS
- • SIGNAL LOCATION

PEAK HOUR SUMMARY

	NORTHBOUND	SOUTHBOUND
TOTAL RUNNING TIME	3 Min 33 Sec.	3 Min. 40 Sec.
TOTAL STANDING DELAY	62 Seconds	68 Seconds
AVERAGE OVERALL SPEED	11.0 M.P.H.	10.6 M.P.H.

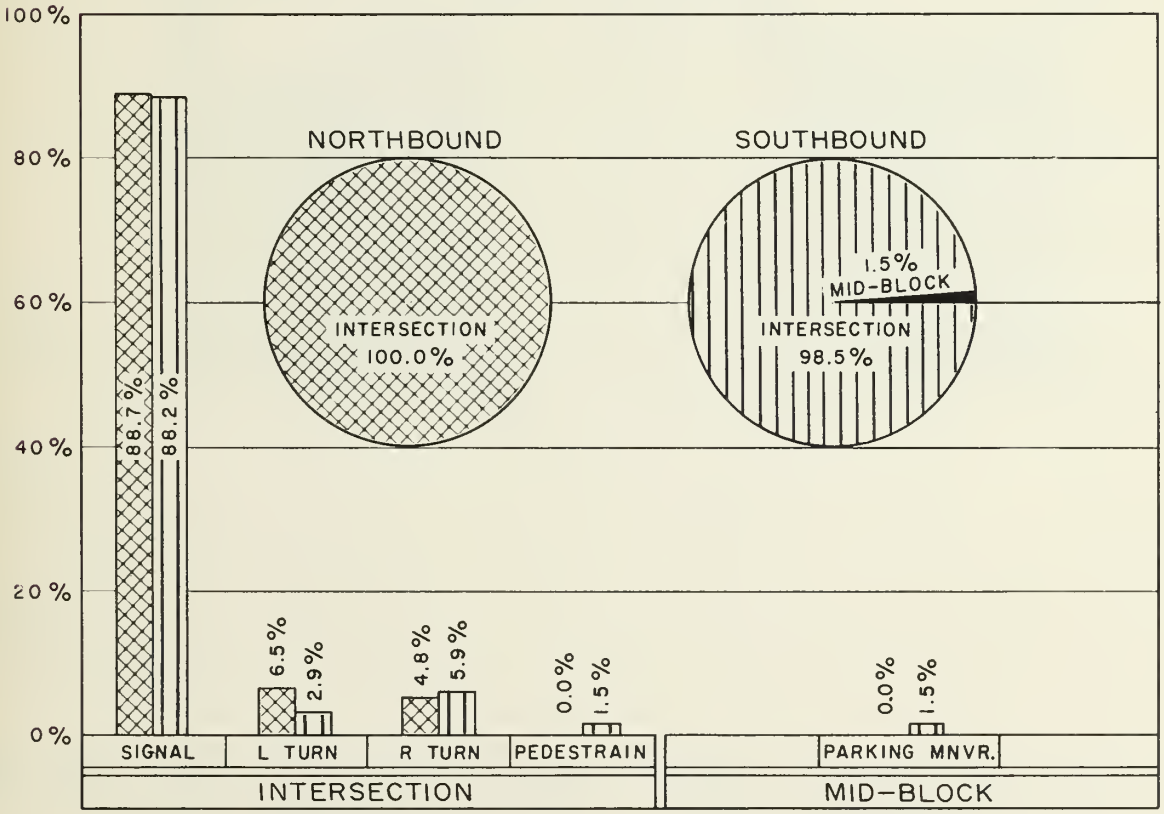
KALISPELL TRAFFIC SURVEY
PEAK HOUR DELAY ANALYSIS
MAIN ST. — FROM 6TH. ST. S. TO IDAHO ST.
0.65 MILES

PERCENT OF OVERALL TIME

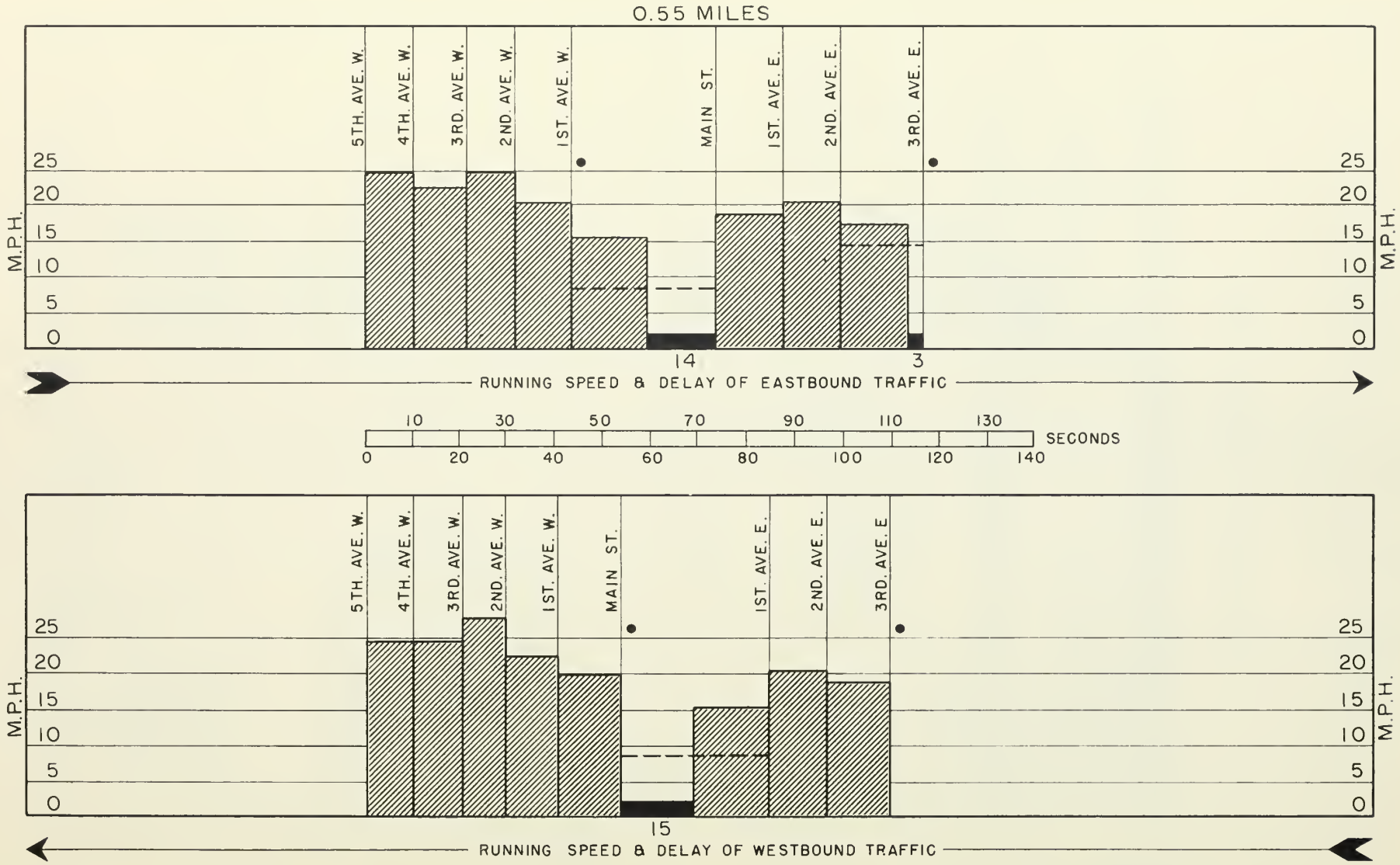


	PEAK HOUR		OFF PEAK HOUR	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
AVERAGE OVERALL TIME	3 MIN. 33 SEC.	3 MIN. 40 SEC.	2 MIN. 34 SEC.	2 MIN. 36 SEC.
AVERAGE OVERALL SPEED	11.0 M.P.H.	10.6 M.P.H.	15.2 M.P.H.	15.0 M.P.H.
AVERAGE TRAVELING SPEED	15.5 M.P.H.	15.4 M.P.H.	18.6 M.P.H.	18.1 M.P.H.

DELAY ANALYSIS



KALISPELL TRAFFIC SURVEY
OFF PEAK HOUR—SPEED & DELAY
IDAHO ST.–FROM 5TH. AVE. W. TO 3RD. AVE. E.



LEGEND

- AVERAGE RUNNING SPEED
- AVERAGE OVERALL SPEED
- AVERAGE STANDING DELAY
- 6 NUMBER OF SECONDS
- • SIGNAL LOCATION

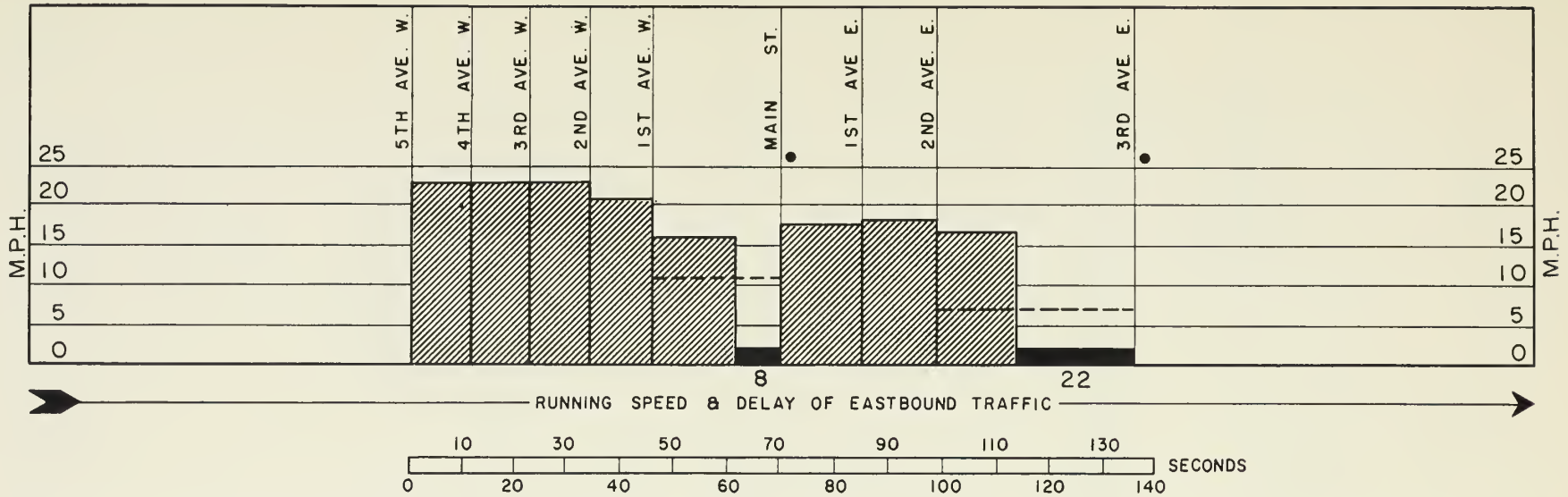
OFF PEAK HOUR SUMMARY

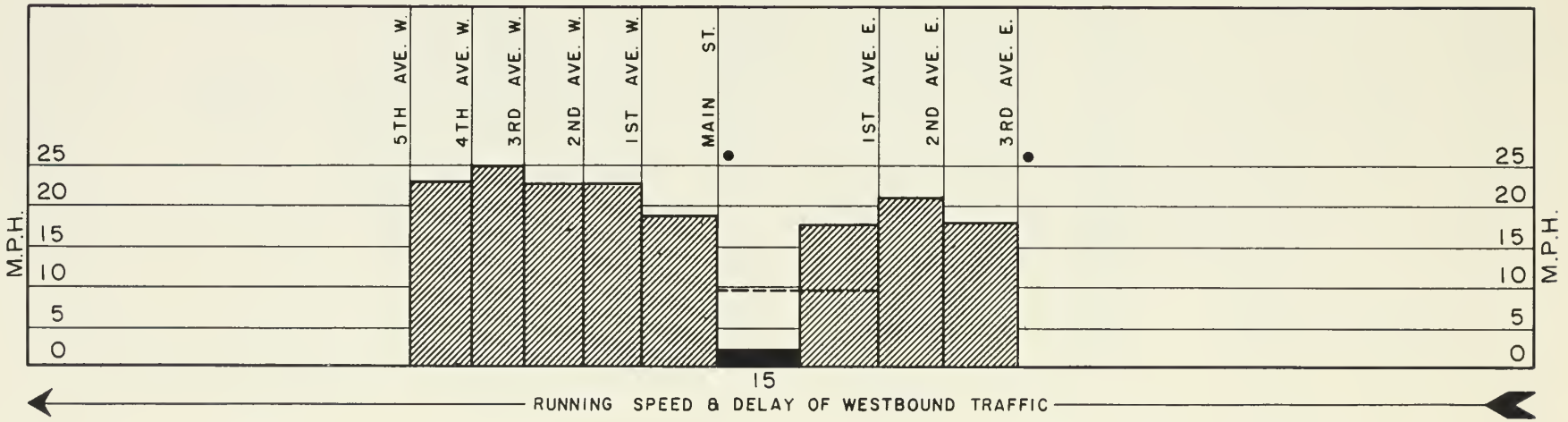
	EASTBOUND	WESTBOUND
TOTAL RUNNING TIME	1 Min. 56 Sec.	1 Min. 49 Sec.
TOTAL STANDING DELAY	17 Seconds	15 Seconds
AVERAGE OVERALL SPEED	17.1 M.P.H.	18.2 M.P.H.

Plate 21

KALISPELL TRAFFIC SURVEY
PEAK HOUR — SPEED & DELAY
IDAHO ST.—FROM 5TH. AVE. W. TO 3RD. AVE. E.

0.55 MILES





LEGEND

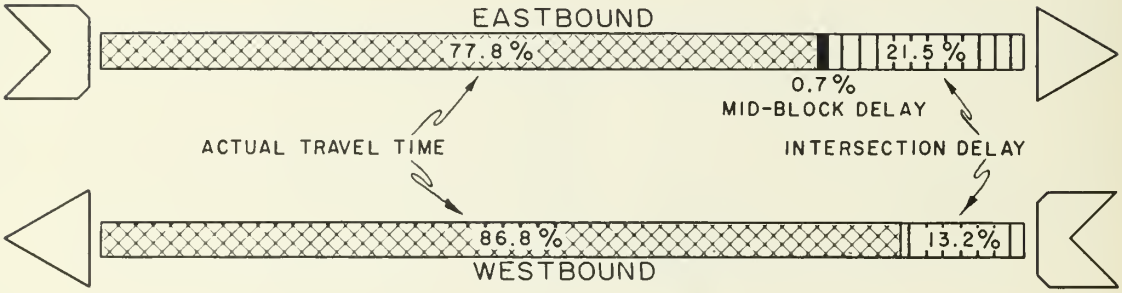
- AVERAGE RUNNING SPEED
- AVERAGE OVERALL SPEED
- AVERAGE STANDING DELAY
- 6 NUMBER OF SECONDS
- • SIGNAL LOCATION

PEAK HOUR SUMMARY

	EASTBOUND	WESTBOUND
TOTAL RUNNING TIME	2 Min. 15 Sec.	1 Min 53 Sec.
TOTAL STANDING DELAY	30 Seconds	15 Seconds
AVERAGE OVERALL SPEED	14.7 M.P.H.	17.6 M.P.H.

KALISPELL TRAFFIC SURVEY
PEAK HOUR DELAY ANALYSIS
IDAHO ST.–FROM 5TH. AVE. W. TO 3RD. AVE. E.
0.55 MILES

PERCENT OF OVERALL TIME



	PEAK HOUR		OFF PEAK HOUR	
	EASTBOUND	WESTBOUND	EASTBOUND	WESTBOUND
AVERAGE OVERALL TIME	2 MIN. 15 SEC.	1 MIN. 53 SEC.	1 MIN. 56 SEC.	1 MIN. 49 SEC.
AVERAGE OVERALL SPEED	14.7 M.P.H.	17.6 M.P.H.	17.1 M.P.H.	18.2 M.P.H.
AVERAGE TRAVELING SPEED	18.9 M.P.H.	20.2 M.P.H.	20.0 M.P.H.	21.1 M.P.H.

DELAY ANALYSIS

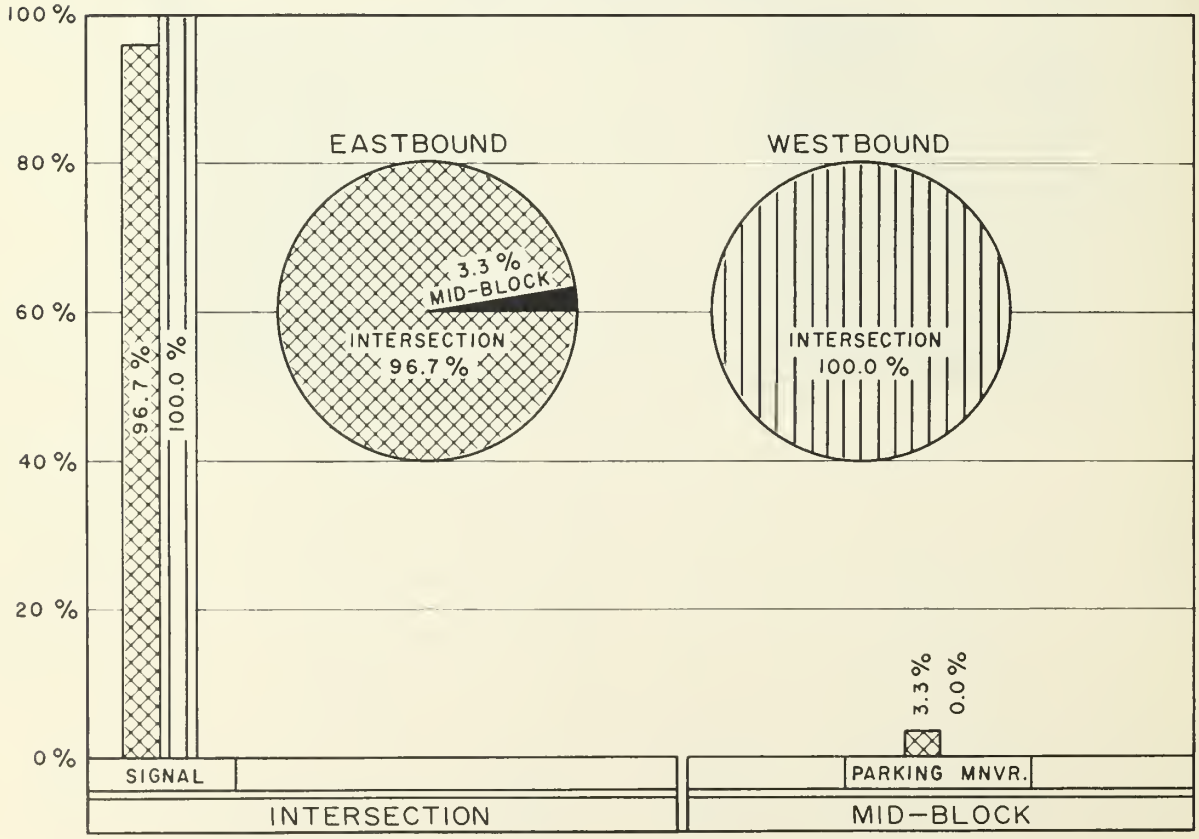


Plate 23

KALISPELL TRAFFIC SURVEY
URBAN ROUTE ANALYSIS
MAIN ST. – FROM 6TH ST. TO IDAHO ST.

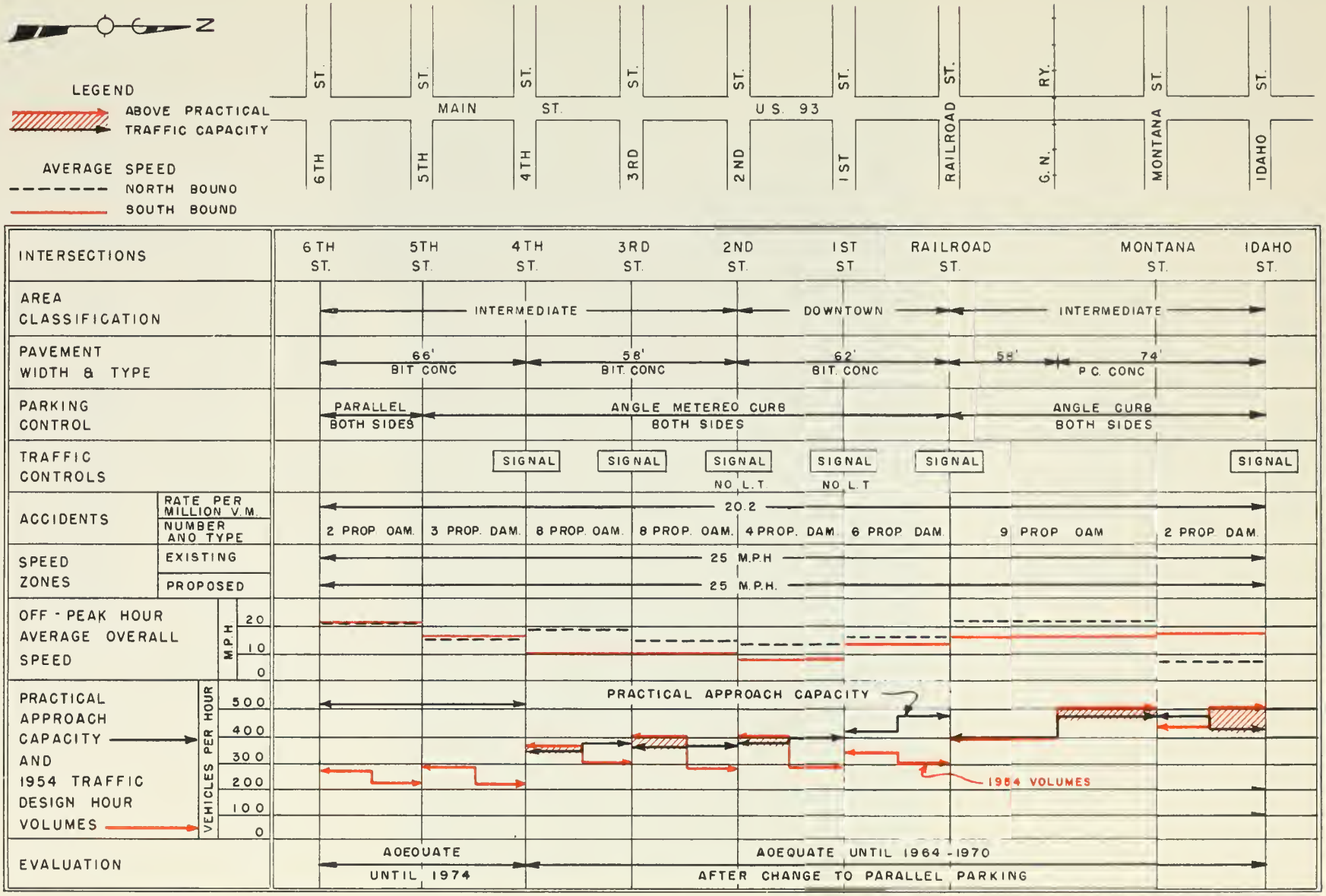
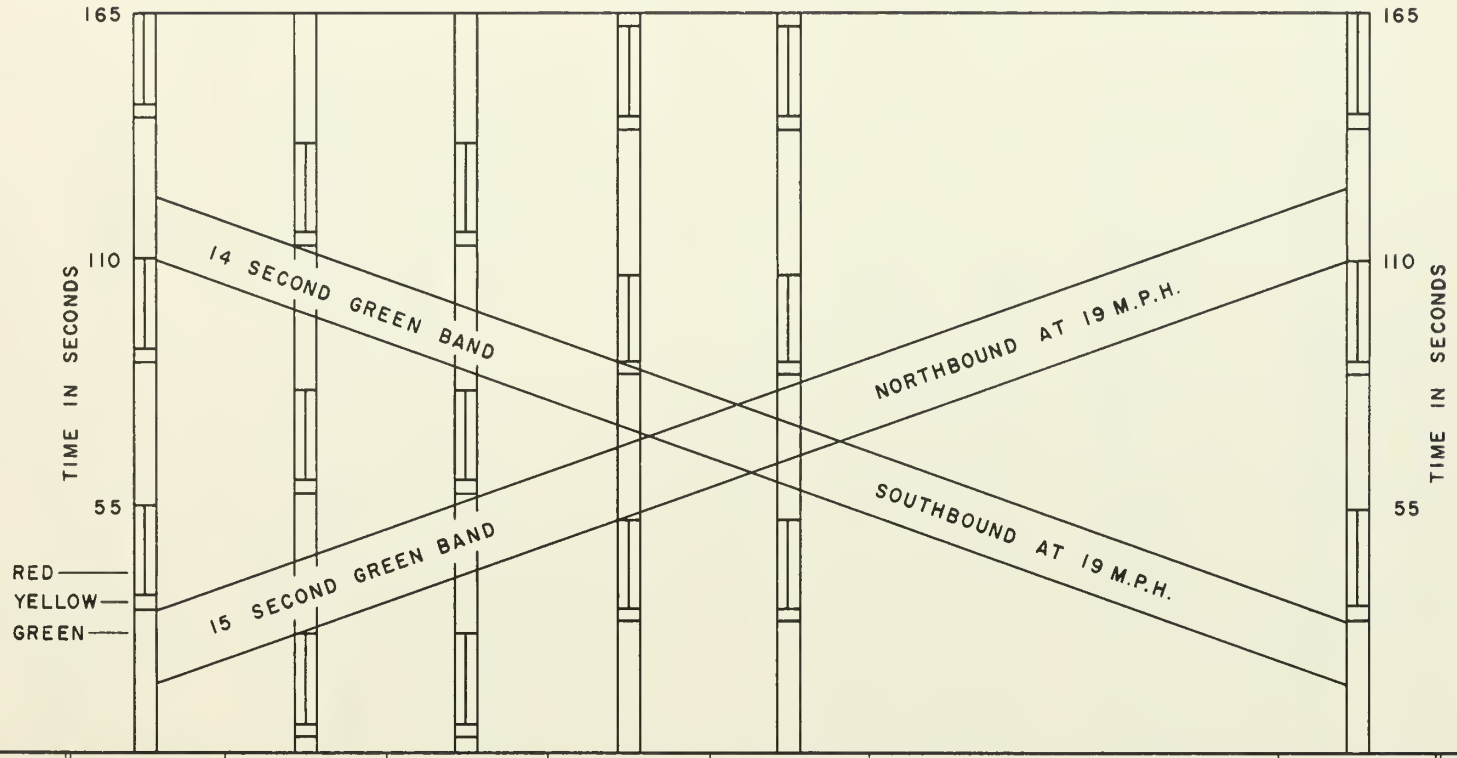


Plate 24

KALISPELL TRAFFIC SURVEY
PROPOSED SIGNAL TIMING
MAIN ST. — FROM 4TH. ST. TO IDAHO ST.

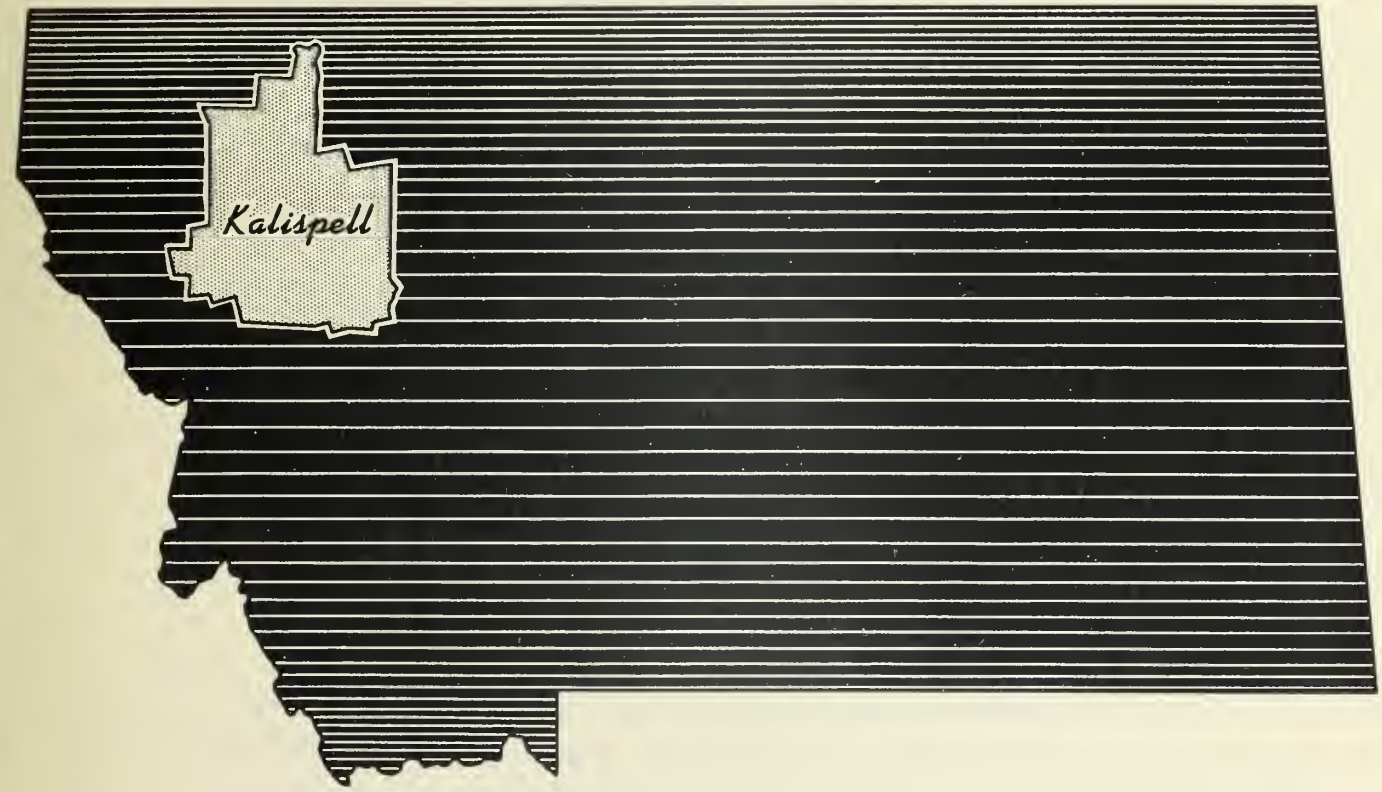
55 SECOND CYCLE — DOUBLE ALTERNATE SYSTEM



CROSS STREET	4TH. ST.	3RD. ST.	2ND. ST.	1ST. ST.	RAILROAD		IDAHO	CROSS STREET
TRAFFIC CONTROL	SIGNAL	SIGNAL	SIGNAL	SIGNAL	SIGNAL		SIGNAL	TRAFFIC CONTROL
ACCUM. DISTANCE	0'	360'	720'	1080'	1440'		2710'	ACCUM. DISTANCE
CYCLE SPLIT	65—35%	65—35%	65—35%	65—35%	65—35%		60—40%	CYCLE SPLIT
MAIN ST. GREEN	32 SECONDS	32 SECONDS	32 SECONDS	32 SECONDS	32 SECONDS		30 SECONDS	MAIN ST. GREEN
" " YELLOW	3 "	3 "	3 "	3 "	3 "		3 "	" " YELLOW
" " RED	20 "	20 "	20 "	20 "	20 "		22 "	" " RED
CYCLE LENGTH	55 "	55 "	55 "	55 "	55 "		55 "	CYCLE LENGTH
GREEN OFFSET	0 "	26 "	26 "	52 "	52 "		0 "	GREEN OFFSET

Plate 25

Part Four



Origin & Destination Study

EXTERNAL ORIGIN AND DESTINATION STUDY

The smallest unit in a traffic problem is the individual, one-way trip. It has been found necessary to study this smallest unit in order to gain some knowledge concerning the entire problem.

Information concerning the individual trip was obtained in the Kalispell area by directly interviewing the drivers of outbound vehicles at four stations located on the principal highways near the city limits. Stations 1 and 3 on U.S. 93 were operated for 16 hours on alternate weekdays from 6 A.M. to 10 P.M. and Stations 2 and 4 on U.S. 2 were operated for the full 24 hours.

The drivers of outbound vehicles were questioned concerning their origin and destination and as to whether they stopped in the city. Directional classification counts were made at each station to provide the necessary expansion factors and machine counts were taken in advance of the survey to determine normal weekday traffic.

The number of usable interviews compared to the average weekday traffic for August 1954 is as follows:

STATION	NUMBER OF INTERVIEWS	AVERAGE WEEKDAY TRAFFIC	PER CENT SAMPLE
1 US 93 N	710	1954	36.3
2 US 2 E	3124	7326	42.6
3 US 93 S	1109	3096	35.8
4 US 2 W	903	2020	44.7
TOTALS	5846	14396	40.6

To aid in summarizing individual trips into significant traffic patterns, Kalispell was divided into zones generally denoting land use characteristics. Each trip was then analyzed, assigned to the proper zone, and numerically coded so that it could be processed on International Business Machines equipment.

The following series of charts illustrate the distribution of passenger car and truck trips from the four external stations to the various zones.

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY

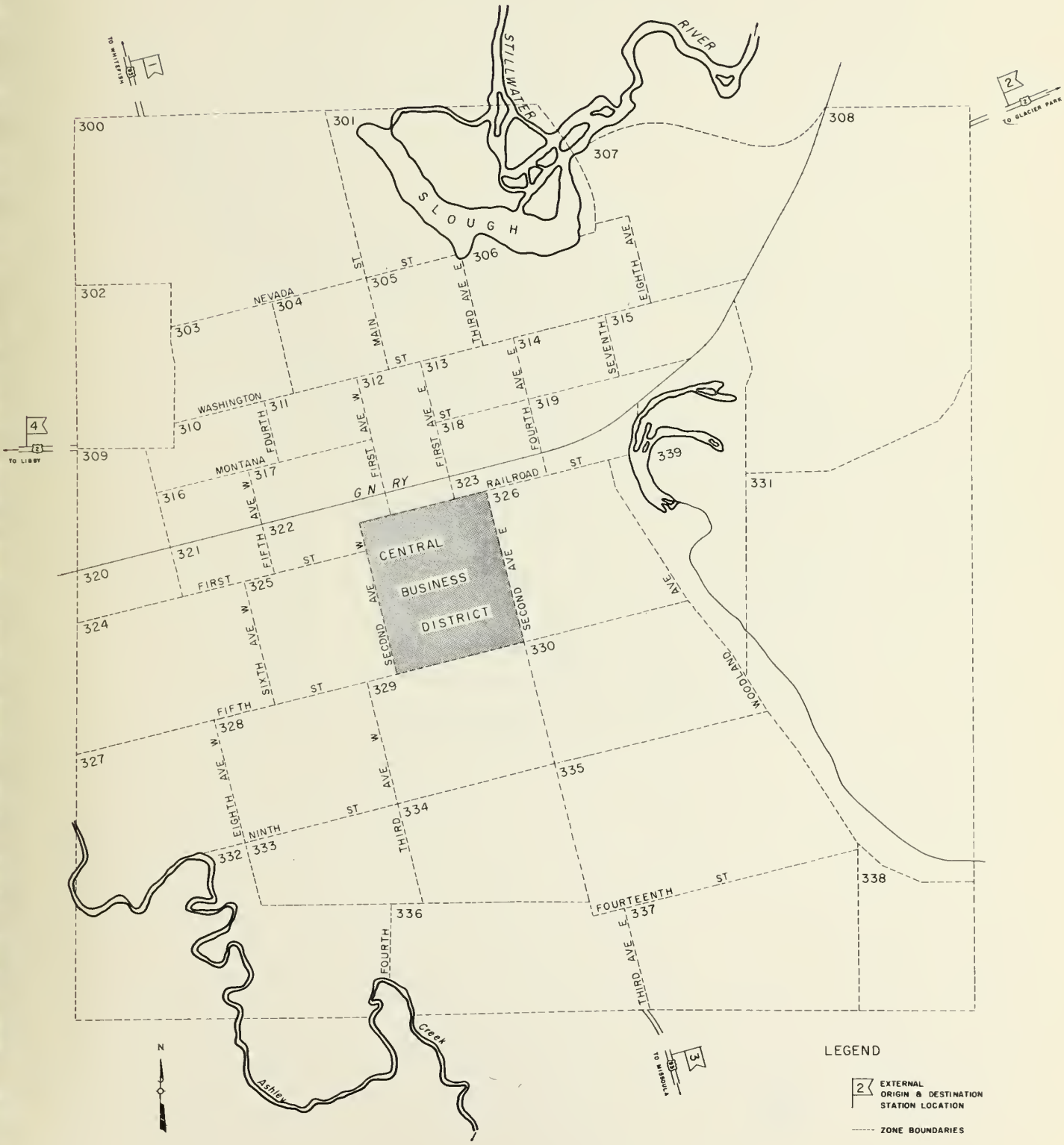


Plate 26

DISTRIBUTION OF ALL PASSENGER CARS AND LIGHT TRUCKS PASSING STATION 1

Plate 27 illustrates traffic desire lines of all passenger cars and light trucks entering and leaving Kalispell on U.S. 93 North during an average weekday in August 1954.

A summary of passenger car and light truck traffic at this station follows:

Average weekday traffic	1731
Per cent to central business district	39.1
Per cent through traffic (North-East)	6.4
Per cent through traffic (North-South)	5.8
Per cent through traffic (North-West)	4.0

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL LIGHT TRUCKS & PASSENGER CARS PASSING STATION 1

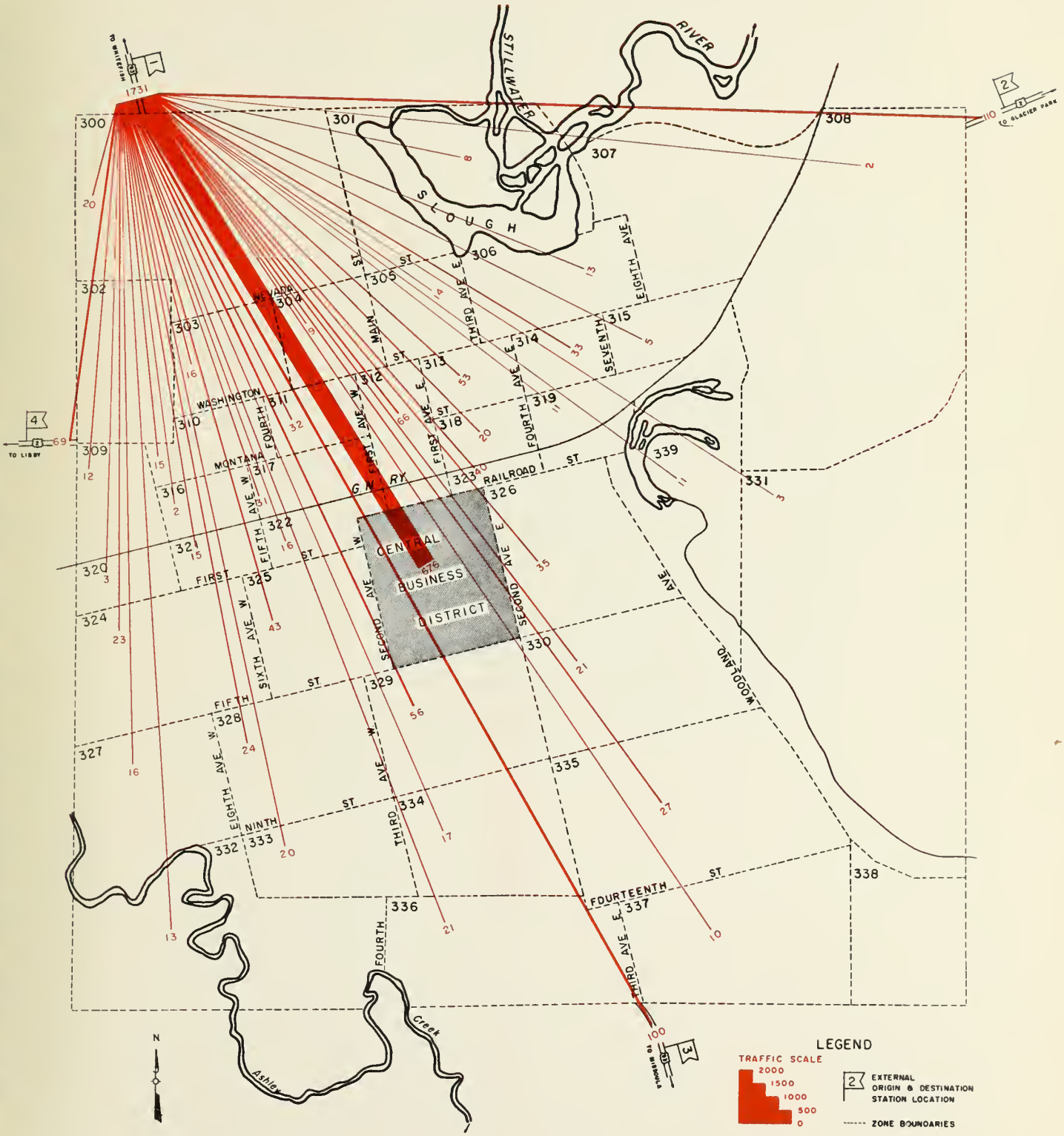


Plate 27

DISTRIBUTION OF ALL MEDIUM AND HEAVY TRUCKS PASSING STATION 1

Plate 28 illustrates traffic desire lines of all medium and heavy trucks entering and leaving Kalispell on U.S. 93 North during an average weekday in August 1954.

A summary of medium and heavy truck traffic at this station follows:

Average weekday traffic	223
Per cent to central business district	32.7
Per cent through traffic (North-East)	6.7
Per cent through traffic (North-South)	7.6
Per cent through traffic (North-West)	1.8

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL MEDIUM & HEAVY TRUCKS PASSING STATION 1

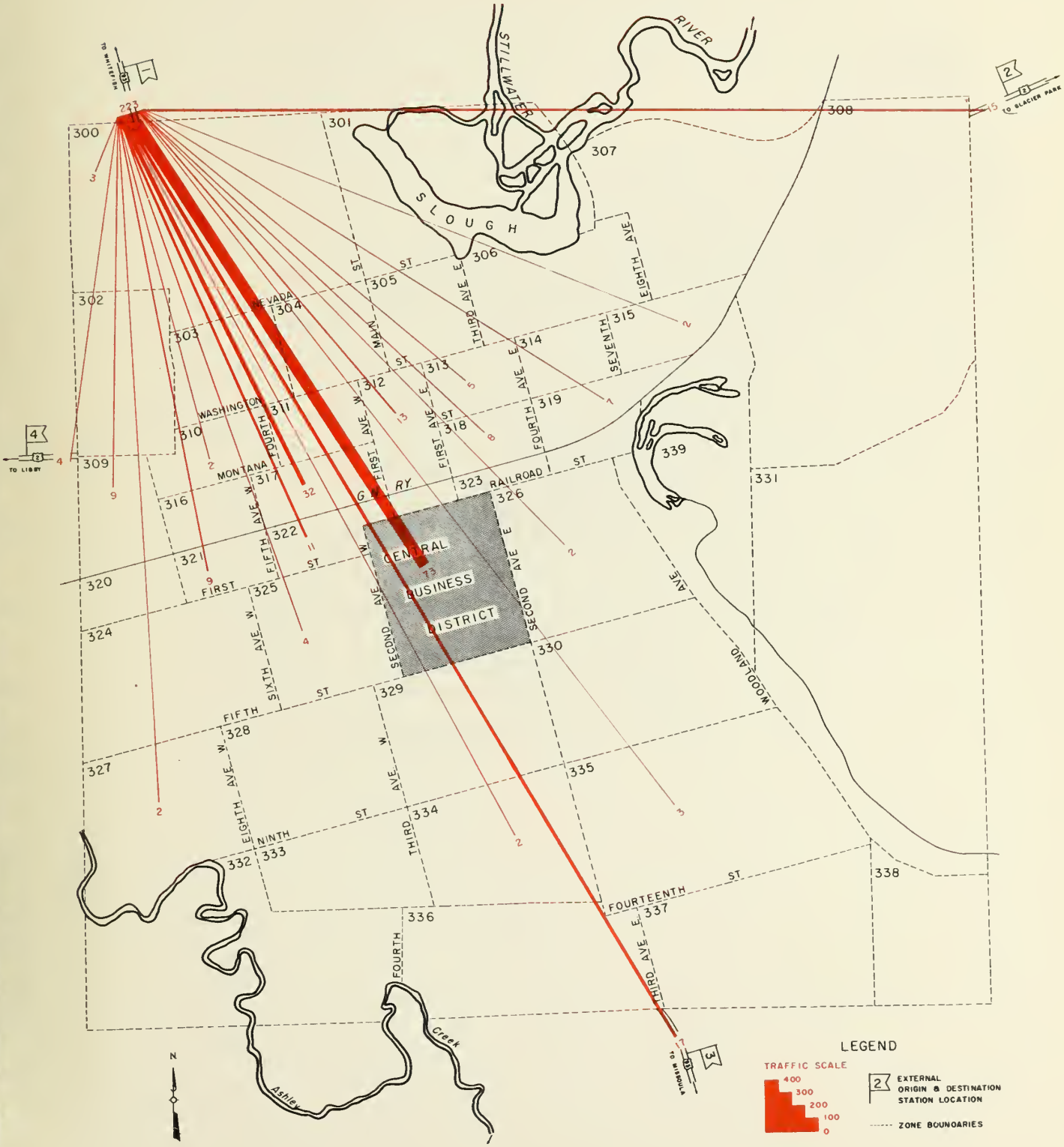


Plate 28

DISTRIBUTION OF ALL PASSENGER CARS AND LIGHT TRUCKS PASSING STATION 2

Plate 29 illustrates traffic desire lines of all passenger cars and light trucks entering and leaving Kalispell on U.S. 2 East during an average weekday in August 1954.

A summary of passenger car and light truck traffic at this station follows:

Average weekday traffic	6787
Per cent to central business district	32.9
Per cent through traffic (East-South)	4.6
Per cent through traffic (East-West)	7.0
Per cent through traffic (East-North)	1.6

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF ALL LIGHT TRUCKS & PASSENGER CARS PASSING STATION 2

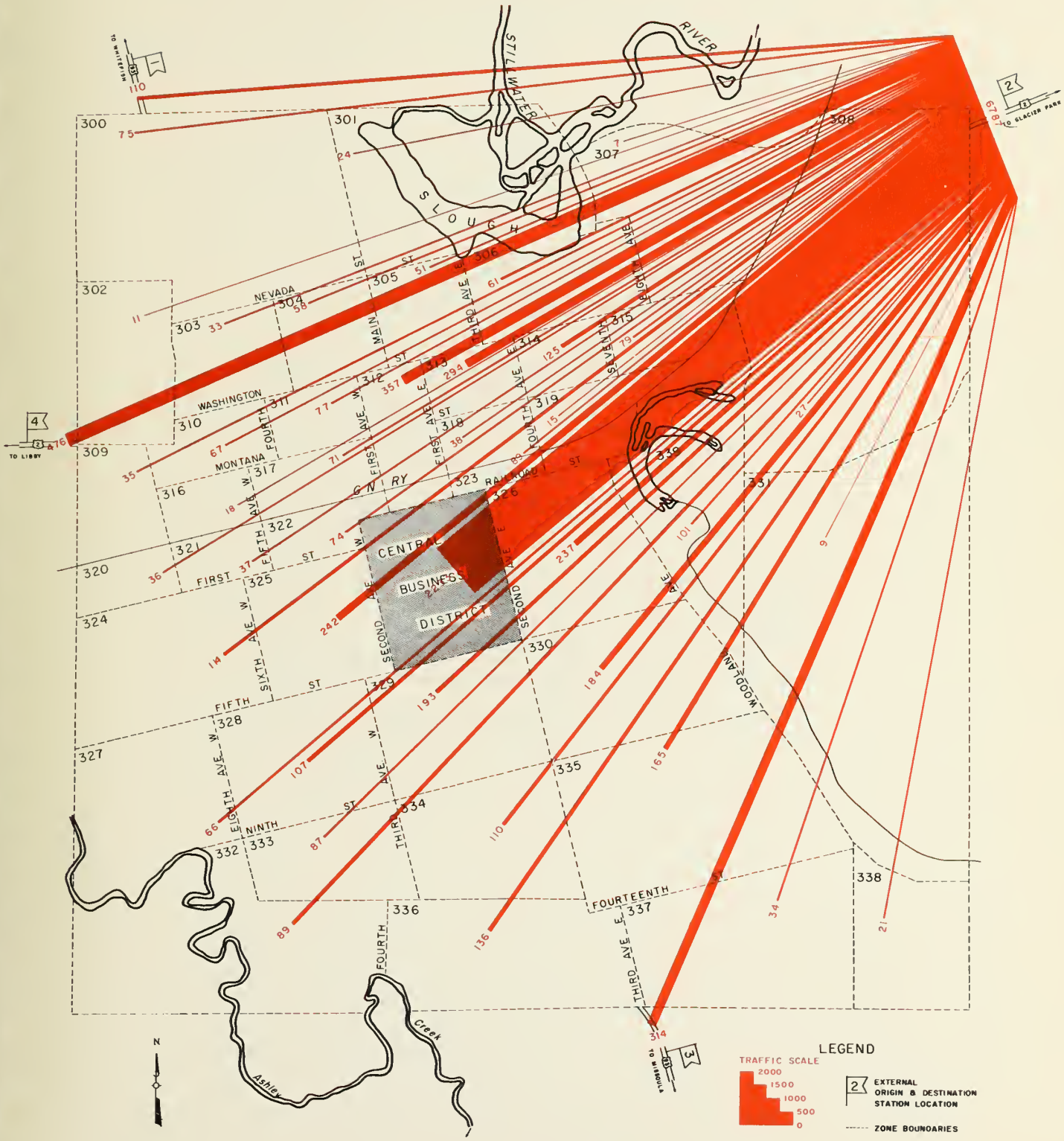


Plate 29

DISTRIBUTION OF ALL MEDIUM AND HEAVY TRUCKS PASSING STATION 2

Plate 30 illustrates traffic desire lines of all medium and heavy trucks entering and leaving Kalispell on U.S. 2 East during an average weekday in August 1954.

A summary of medium and heavy truck traffic at this station follows:

Average weekday traffic	539
Per cent to central business district	23.2
Per cent through traffic (East-South)	3.9
Per cent through traffic (East-West)	10.0
Per cent through traffic (East-North)	2.8

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL MEDIUM & HEAVY TRUCKS PASSING STATION 2

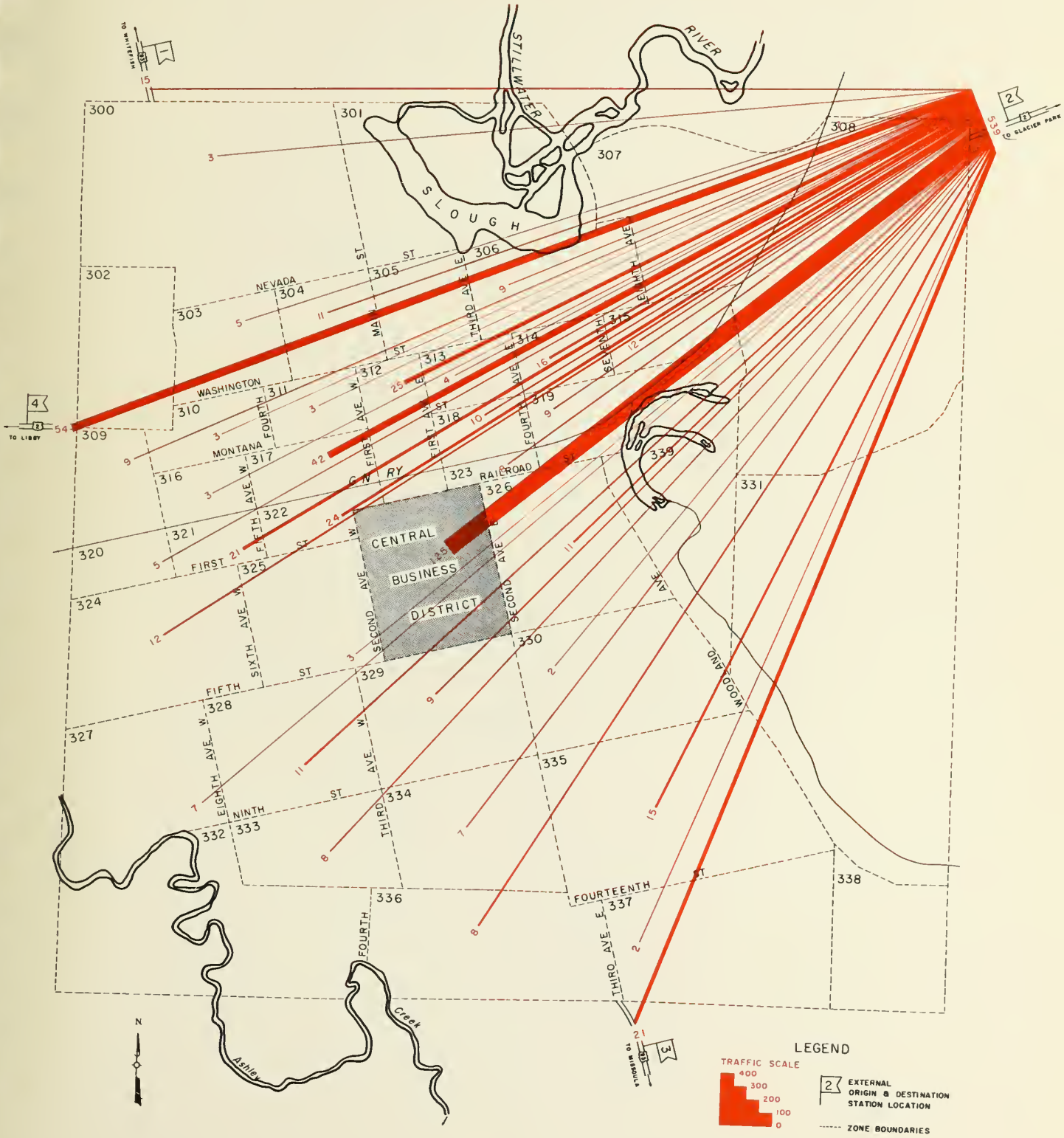


Plate 30

DISTRIBUTION OF ALL PASSENGER CARS AND LIGHT TRUCKS PASSING STATION 3

Plate 31 illustrates traffic desire lines of all passenger cars and light trucks entering and leaving Kalispell on U.S. 93 South during an average weekday in August 1954.

A summary of passenger car and light truck traffic at this station follows:

Average Weekday Traffic	2829
Per Cent to Central Business District	35.4
Per Cent Through Traffic (South-West)	2.6
Per Cent Through Traffic (South.North)	3.5
Per Cent Through Traffic (South-East)	11.1

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL LIGHT TRUCKS & PASSENGER CARS PASSING STATION 3

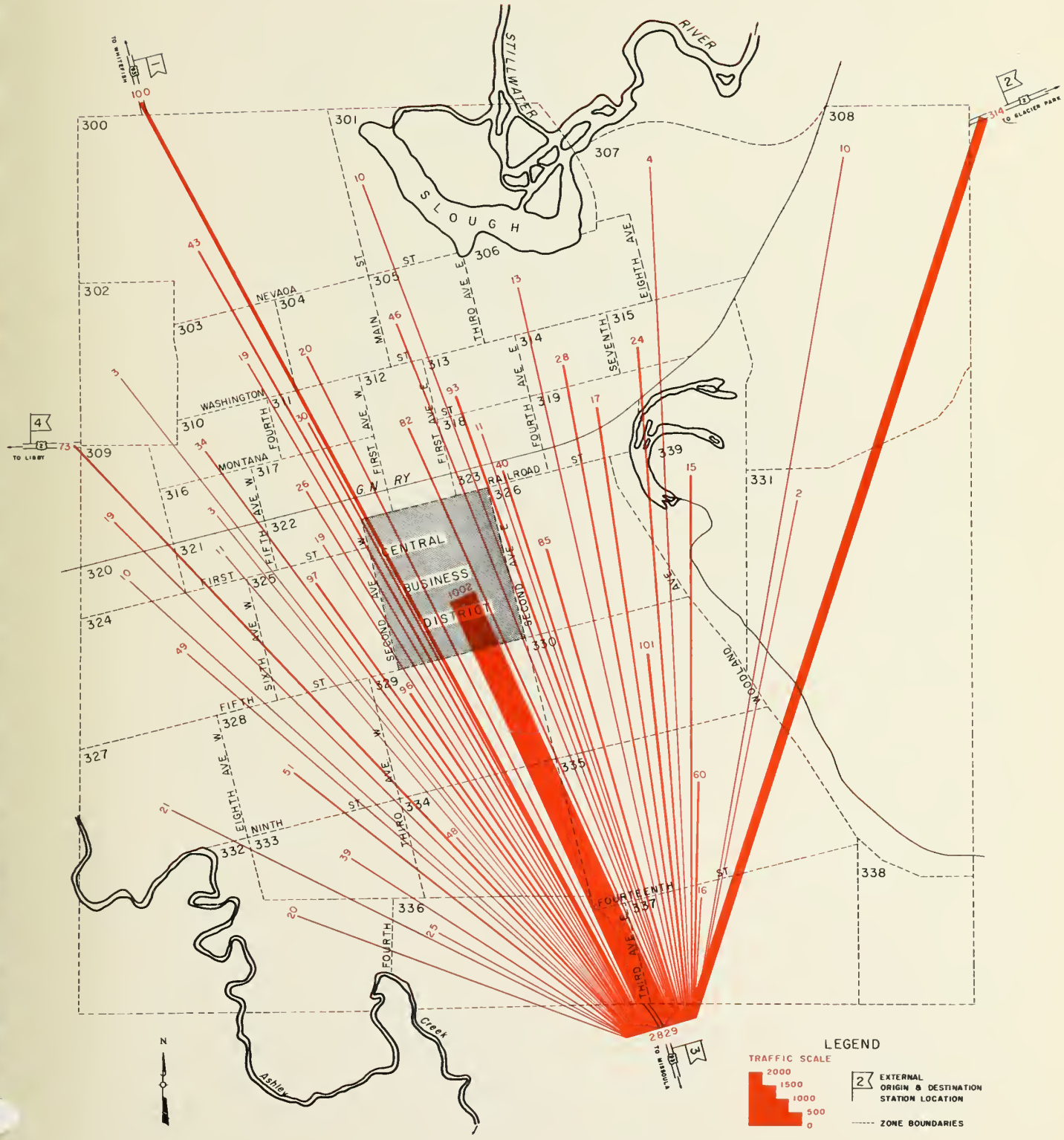


Plate 31

DISTRIBUTION OF ALL MEDIUM AND HEAVY TRUCKS PASSING STATION 3

Plate 32 illustrates traffic desire lines of all medium and heavy trucks entering and leaving Kalispell on U.S. 93 South during an average weekday in August 1954.

A summary of medium and heavy truck traffic at this station follows:

Average Weekday Traffic	267
Per Cent to Central Business District	22.1
Per Cent Through Traffic (South-West)	4.9
Per Cent Through Traffic (South-North)	6.4
Per Cent Through Traffic (South-East)	7.9

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL MEDIUM & HEAVY TRUCKS PASSING STATION 3

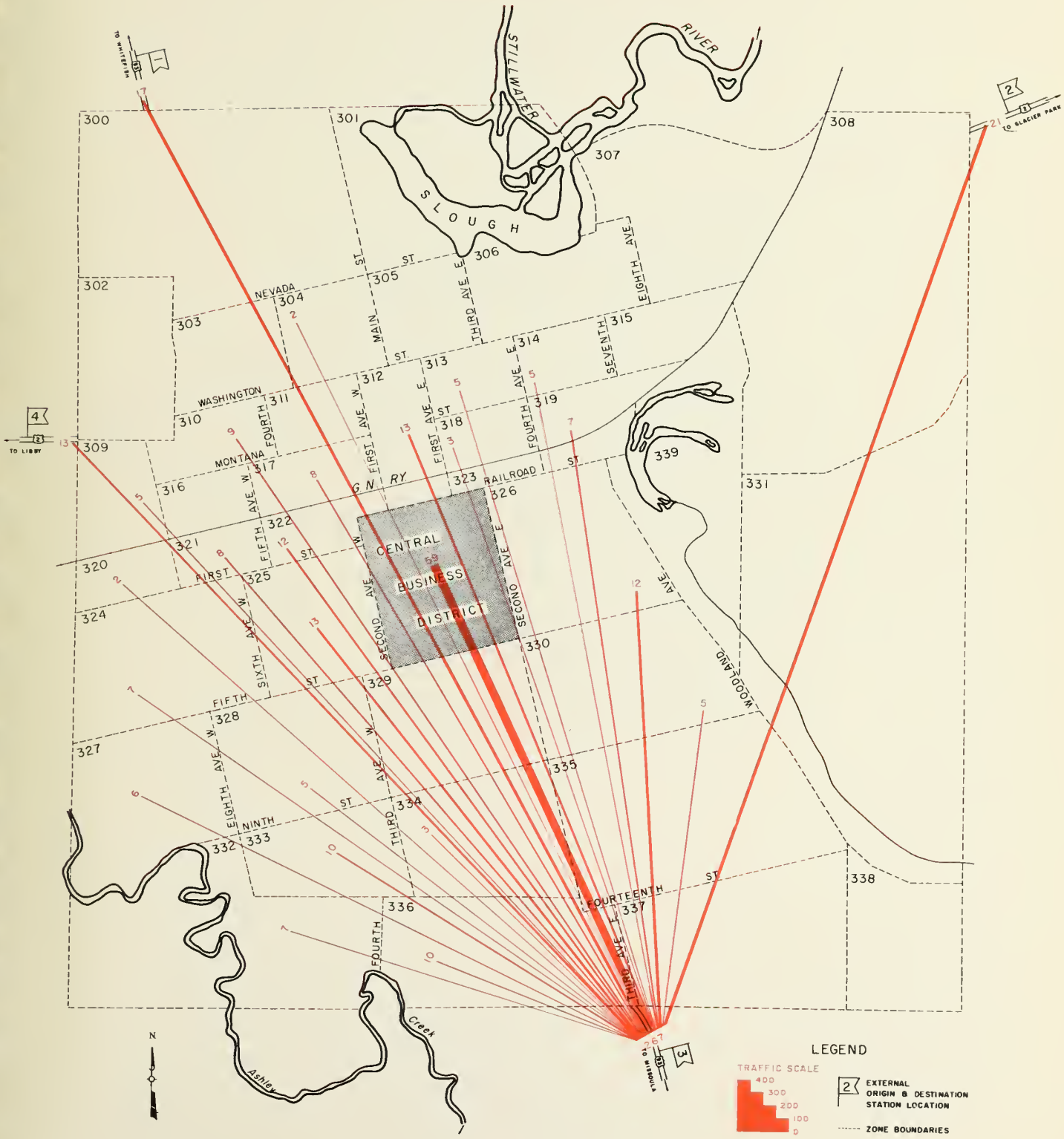


Plate 32

DISTRIBUTION OF ALL PASSENGER CARS AND LIGHT TRUCKS PASSING STATION 4

Plate 33 illustrates traffic desire lines of all passenger cars and light trucks entering and leaving Kalispell on U.S. 2 West during an average weekday in August 1954.

A summary of passenger car and light truck traffic at this station follows:

Average Weekday Traffic	1771
Per Cent to Central Business District	23.9
Per Cent Through Traffic (West-North)	3.9
Per Cent Through Traffic (West-East)	26.9
Per Cent Through Traffic (West-South)	4[illegible].1

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF ALL LIGHT TRUCKS & PASSENGER CARS PASSING STATION 4

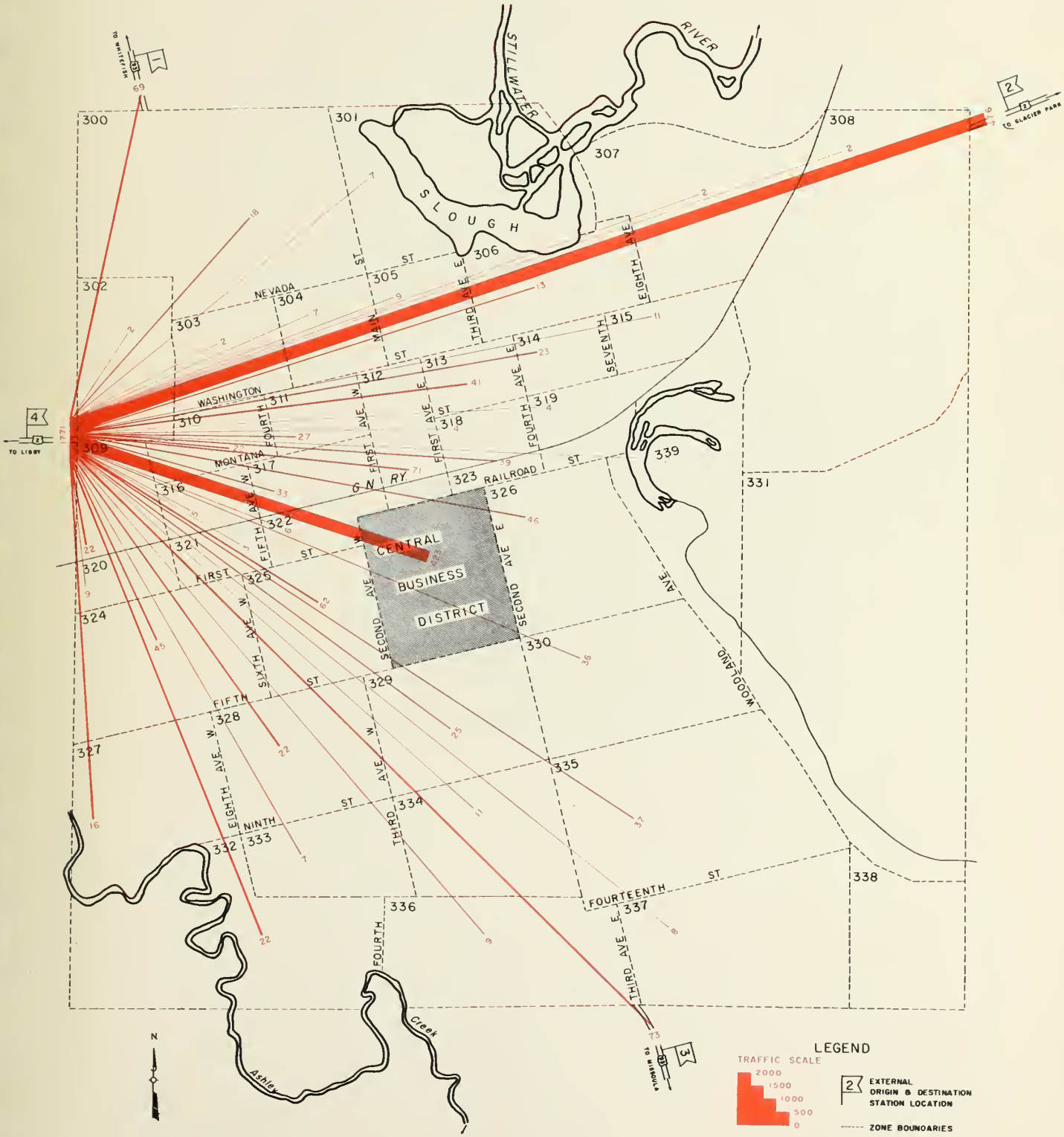


Plate 33

DISTRIBUTION OF ALL MEDIUM AND HEAVY TRUCKS PASSING STATION 4

Plate 34 illustrates traffic desire lines of all medium and heavy trucks entering and leaving Kalispell on U.S. 2 West during an average weekday in August 1954.

A summary of medium and heavy truck traffic at this station follows:

Average Weekday Traffic	249
Per Cent to Central Business District	13.7
Per Cent Through Traffic (West-North)	1.6
Per Cent Through Traffic (West-East)	21.7
Per Cent Through Traffic (West-South)	5.2

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL MEDIUM & HEAVY TRUCKS PASSING STATION 4

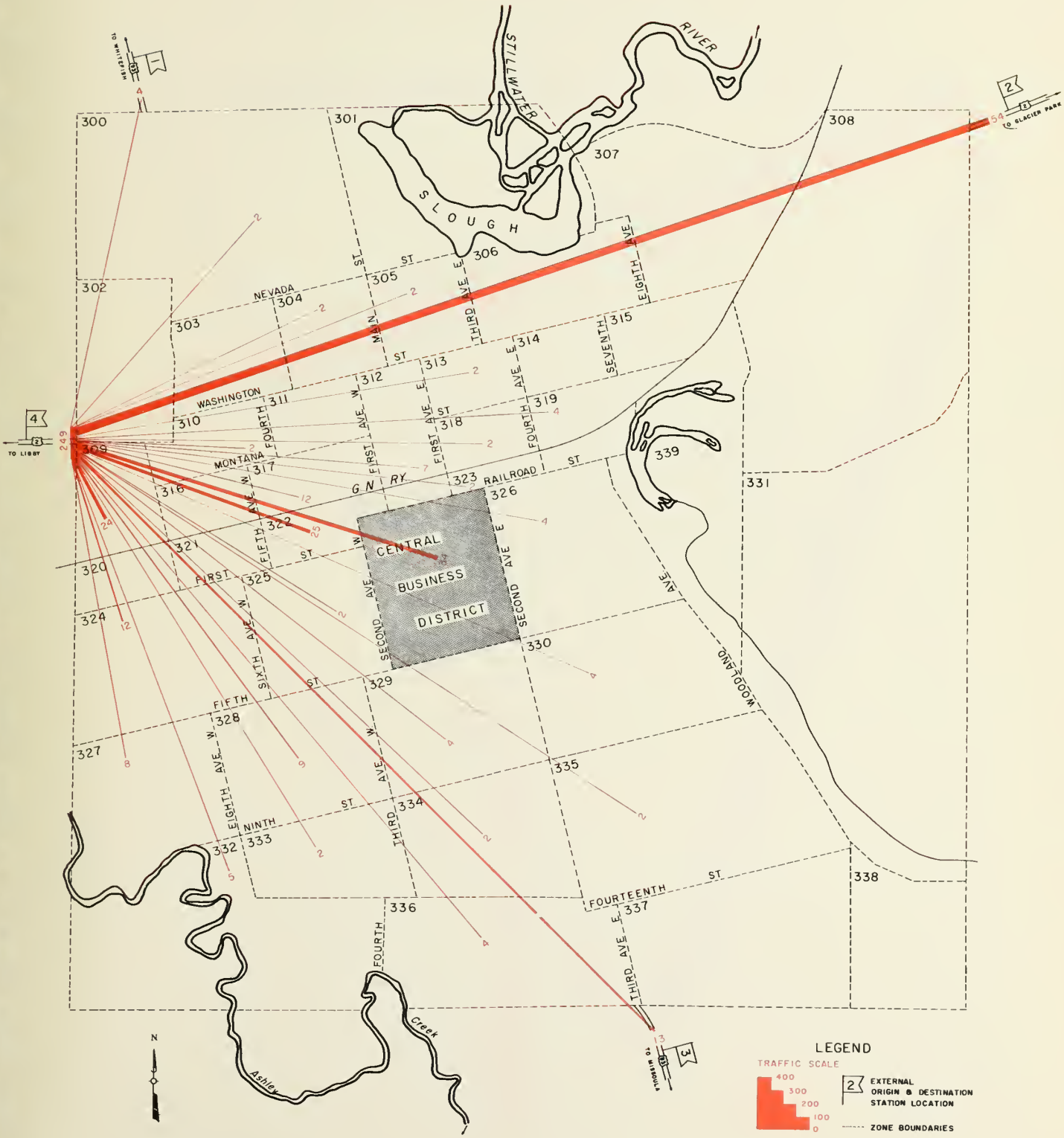
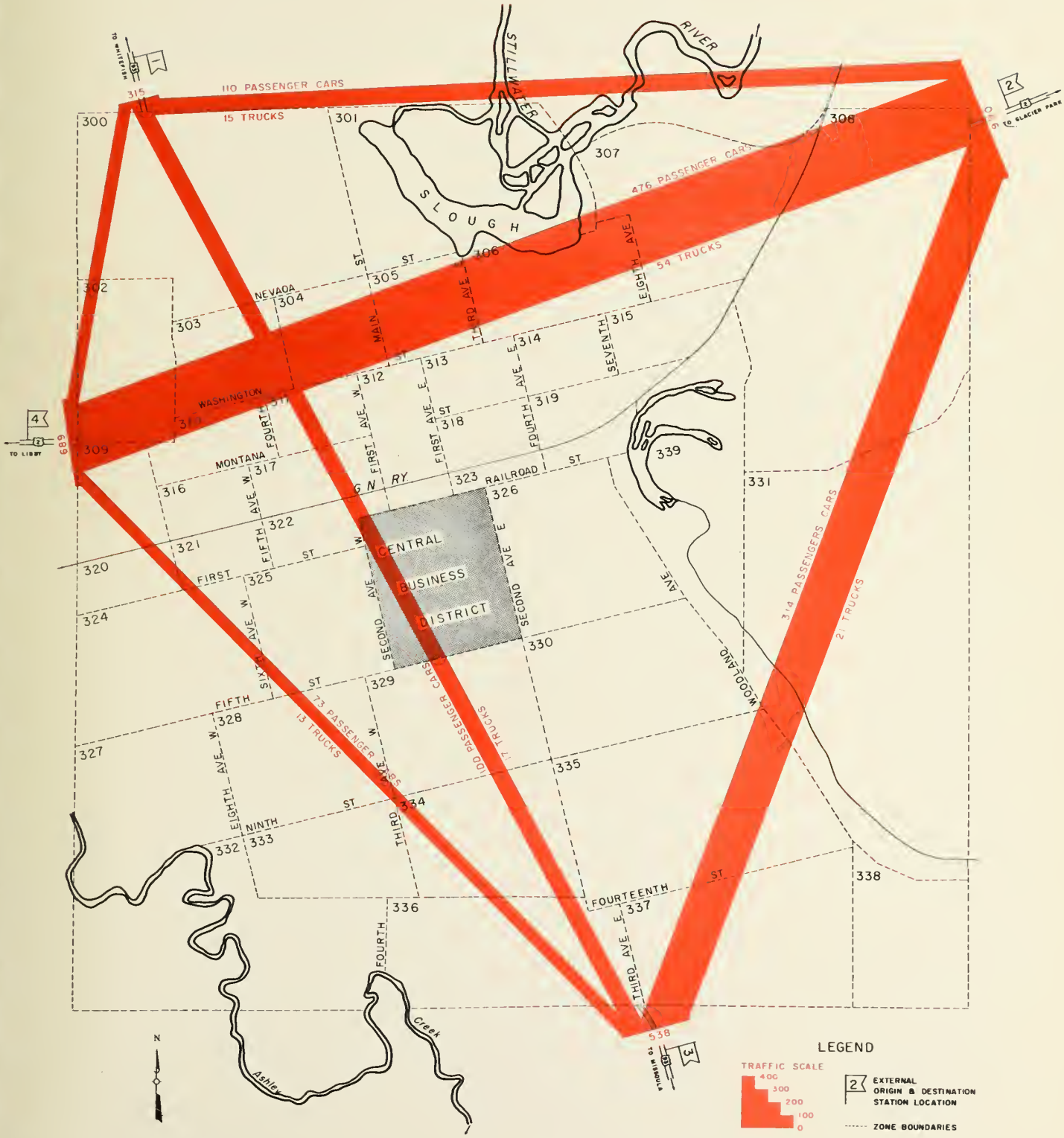


Plate 34

DISTRIBUTION OF THROUGH TRAFFIC, ALL VEHICLES

Plate 35 illustrates the interchange of all through traffic between external stations on an average weekday in August 1954.

KALISPELL TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF THROUGH TRAFFIC ALL VEHICLES



LEGEND

TRAFFIC SCALE 400 300 200 100 0

2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION

ZONE BOUNDARIES

Plate 35